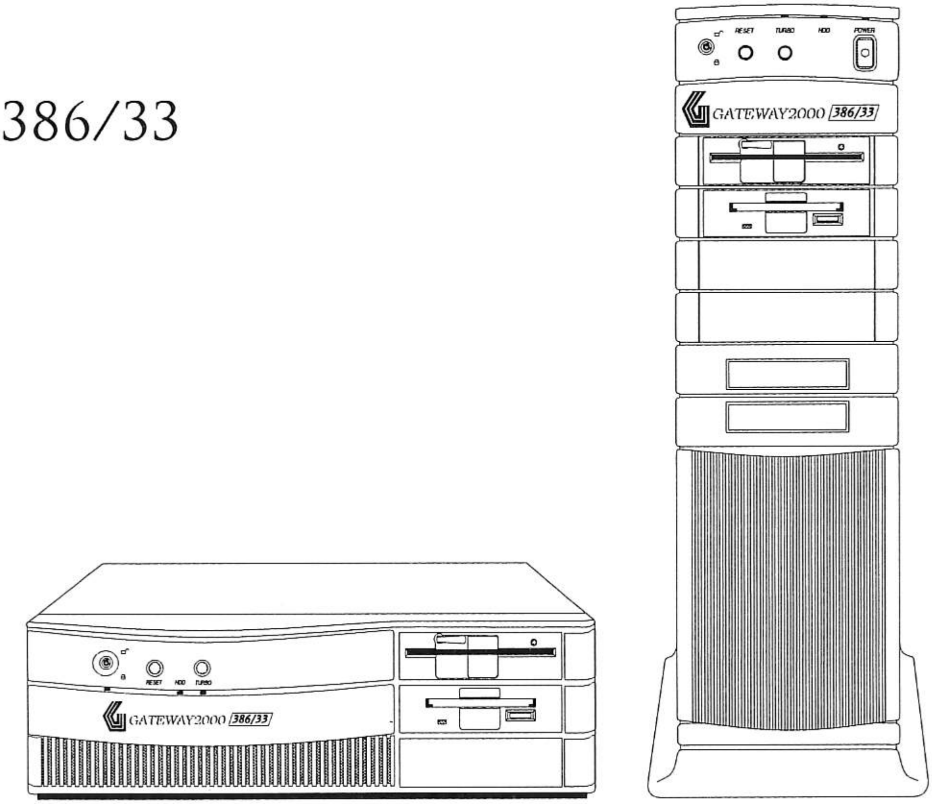
GATEWAY 2000

COMPUTER SYSTEM

▲ 386/33



Part # 070-00403 Rev. 1.10

USER'S GUIDE

Notices

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Gateway 2000
610 Gateway Drive
N. Sioux City, SD 57049 USA
605/232-2000 (Local and International Callers)
800/523-2000 (Customer Service)
800/248-2031 (Technical Service)
605/232-2023 (FAX)
605/232-2109 (BBS Data Line)

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FCC statement

Class B Digital Device. This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of more of the following measures:

- ☐ Reorient or relocate the receiving antenna
- ☐ Increase the seperation between the equipment and receiver
- ☐ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- ☐ Consult an experienced radio/TV technician for help.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To meet FCC requirements, shielded cables and power cords are required to connect this device to a personal computer or other Class B certified device.

About this book

We recommend that you read the first four chapters of this book carefully before installing or using your new system. They are designed to help you unpack, set up, and begin using the computer system as quickly as possible. The rest of the book contains reference information designed to help you get the most out of your system.

This book contains the following chapters:

- Chapter 1, "Unpacking the System" describes how to unpack the 386/33 system and check it for shipping damage.
- Chapter 2, "Setting Up the System" describes how to set up the system and explains its basic features.
- Chapter 3, "Keeping the System in Good Shape" describes how to care for the system and protect it (and your data).
- Chapter 4, "Inside the Computer System" describes how to open the system unit, and gives a brief introduction to the system's components.
- Chapter 5, "The System Board" contains detailed descriptions of the 386/33 system board.
- Chapter 6, "Hard Disk Drives and Controllers" contains instructions on how to install, configure, low-level format, partition, and high-level format the hard disk drive included with your system.
- Chapter 7, "Floppy Disk Drives" explains the differences between the various types of floppy disk drives, and lists the formatting instructions for each type.
- Chapter 8, "Extended and Expanded Memory" describes the differences between conventional, expanded, and extended memory.
- Chapter 9, "Video Display and Display Adapter" discusses the display adapter card.
- Chapter 10, "Serial and Parallel Ports" contains information about the serial and parallel interfaces.
- Chapter 11, "Using the Mouse" contains information about the mouse.
- Chapter 12, "Maintenance and Troubleshooting" contains information about cleaning the system and also a troubleshooting guide.
- Appendix A contains a glossary of computer terms used in this manual.
- If your system contains optional equipment, there may be additional appendices describing the options.
- An index is found at the end of this manual.

Specifications

The following specifications are for the standard configuration; your system may contain optional equipment. All specifications are subject to change without notice or obligation.

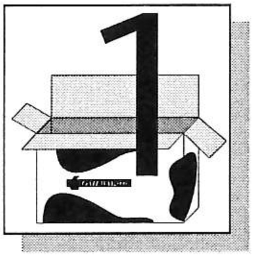
Desktop case dimensions	(W x D x H) 21 x 16.5 x 6 inches
Tower case dimensions	(W x D x H) 7 x 16.5 x 24 inches
Keyboard dimensions	101-key: (W x D x H) 18.25 x 8.25 x 2 inches 124-key: (W x D x H) 20.25 x 8 x 2.25 inches
CPU	Intel 33 MHz 80386DX with on-chip floating point unit, and 32-bit architecture
CPU speed	33 MHz; may be slowed down for compatibility with software that requires slower CPU speed
Bus speed	8.3 MHz
Cache	64K direct-mapped cache with 25ns SRAM
RAM type	256KB x 9, 1MB x 9, or 4MB x 9 70ns DRAM SIMMs
RAM capacity	8MB provided; expandable up to 32MB on the system board; expandable to 64MB with optional 32-bit memory expansion card using 4MB SIMMs
Coprocessor	Optional; socket provided for Intel 80387 or Weitek 3167
BIOS	Phoenix BIOS
Expansion slots	Eight 16-bit expansion slots are provided on the system board; six are unused in the standard configuration
Battery	4.5 - 6V battery required for clock/calendar
I/O ports	One parallel and two serial ports
Mouse	Microsoft serial mouse included with system
Graphics adapter	VGA graphics adapter with 1MB of RAM provides up to 1024 x 768 non-interlaced resolution with 256 colors
Power supply	200 watts; switchable for 110VAC and 220VAC operation; furnished with standard IEC power connector for easy power cable changeover in international applications
Floppy disk drives	1.2MB 5.25" Epson floppy drive; 1.44MB 3.5" Epson floppy drive
Hard disk drive	200MB Western Digital IDE hard drive with 64K multi-segmented cache; 15ms access time, 10Mb/second DTR
Software	MS-DOS and Windows are loaded onto the hard drive at our factory; master diskettes provided

Assembling your manual

To protect your manual from damage during shipment, we shrink-wrapped the pages and packaged them separately from the tabs. Manual chapters that describe options which vary from system to system are packaged separately. This allows us to tailor a manual to your specific system.

To assemble the manual, insert the pages in the binder. Insert the chapters in the correct order. If any of your manual sections do not have a chapter number, you should put them in the back of the manual with the Appendices. Place the tabs between the chapters. Refer to the headings in the Contents on page iii to see where the tabs should be inserted.

Unpacking the System



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Unpacking and inspecting the system

Important! If your computer arrives in cold weather, allow the system unit and monitor to warm up to room temperature before removing them from their boxes. Exposing a cold computer to a warm room causes condensation that could damage the system. If condensation forms, wait for it to dry before plugging in the system.

Check the shipping cartons for wrinkled or damaged corners, holes through the cardboard, or other signs of rough handling or abuse. If you detect any signs of damage, notify the shipping carrier at once.

Carefully remove the system unit, keyboard, accessory bag, and any options you ordered (DOS, mouse, etc.) from the shipping container. Take care not to damage the packing materials.

Inside the monitor box are the monitor, the video cable (used to attach the monitor to the system unit), and the monitor's instruction manual.

The best way to unpack a monitor box is to open the top of the box and then carefully turn the box upside down while supporting the monitor inside. Set the monitor on its top on the floor or a table, and then pull the box up and off. Remove the foam packing.

Place each item on your table and inspect all sides, including the bottom of the keyboard and system unit. ***For your protection, call and report any damage to the carrier at once.***

Save all cushioning and packing materials so that you can repack the system safely in case you ever need to move or ship it.

Checking the packing list

The packing list for your system is on the outside of the shipping container. Check it and make certain that you received everything on the list.

Checking card, cable, and chip seating (optional)

Your 386/33 system was checked and carefully packed before it left Gateway 2000, but sometimes excessive vibration and shock during truck and air shipping can loosen cards, cable connectors, or IC chips. While this is very rare, it is a good idea to open up the system unit and make sure that nothing has come loose. Detailed instructions describing how to open the system unit are found in Chapter 4 of this manual.

To check card, cable, and chip seating, open the system unit cabinet as described in Chapter 4. Then:

1. Make sure that all the circuit boards are completely seated in their slots by firmly pressing down on them with your thumbs or the heel of your hand. Do not use excessive force.
2. Make sure that all power supply and disk drive cables are securely attached to their connectors. Many systems have unused cables for additional options. Don't worry if the system has cables that are not attached to anything, provided that each disk drive is connected to one ribbon cable and one power supply cable. The other ends of the ribbon cables connect to the disk host adapter card, installed in one of the system's expansion slots. If you have any questions about these connections, contact Gateway 2000 Technical Service.
3. Make sure that all socketed ICs and SIMMs are firmly seated in their sockets. If a chip has popped out, carefully reinstall it in its socket, observing the static electricity precautions found in Chapter 4 of this manual. Make sure that no pins are bent under the chip, or outside of the socket.
4. Replace the system unit cover.

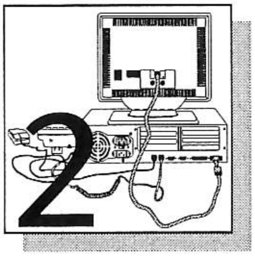
Serial port adapter cable

The I/O interface card supplied with your system has a 9-pin serial port connector. If you already have a serial cable with a 25-pin connector, you can use the supplied 9-pin to 25-pin adapter cable instead of buying a new cable.

Continuing on

This completes the unpacking procedure. Please continue on with Chapter 2, "Setting Up the System."

Setting Up the System



2

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Getting Started

Before shipping your Gateway 2000 386/33 system:

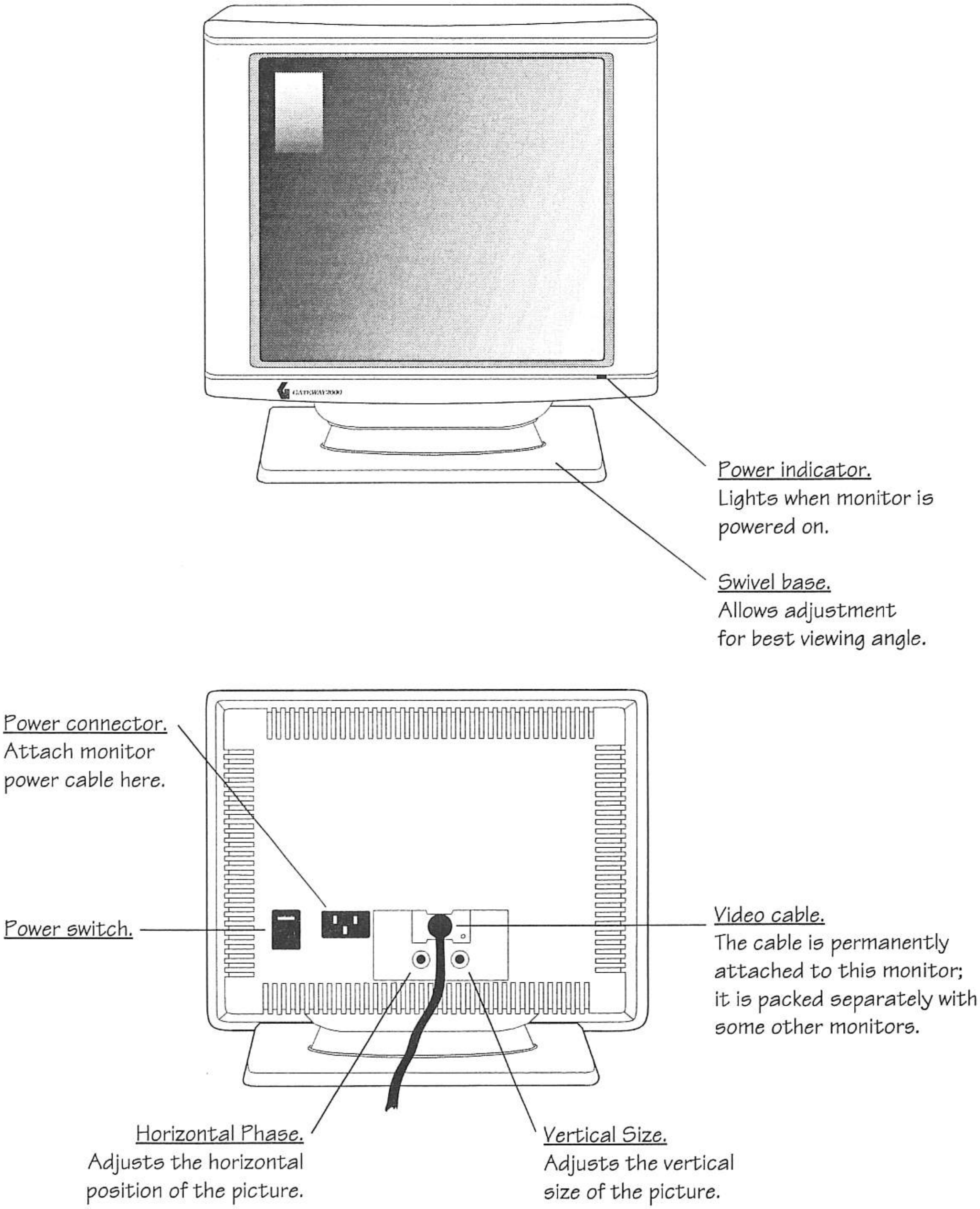
- ☐ We ran its setup program and specified the correct hardware configuration
- ☐ We set up the display adapter to match the monitor you ordered
- ☐ We low-level formatted the hard disk, partitioned it, formatted it for DOS, and then installed the version of MS-DOS you ordered and the latest version of Windows.

In short, the most complicated and difficult parts of setting up the system have already been done for you.

The part we've left for you is comparatively easy! The next few pages help you set up the system, and introduce you to its various components and controls. If you encounter any difficulties, refer to Chapter 12 for troubleshooting information.

What you need to set up a system

- ☐ Uncluttered table with nearby grounded power outlet
- ☐ Small flat-bladed screwdriver
- ☐ Small Phillips-head screwdriver
- ☐ Power filter/surge protector *(optional)*.



Power indicator.
Lights when monitor is powered on.

Swivel base.
Allows adjustment for best viewing angle.

Power connector.
Attach monitor power cable here.

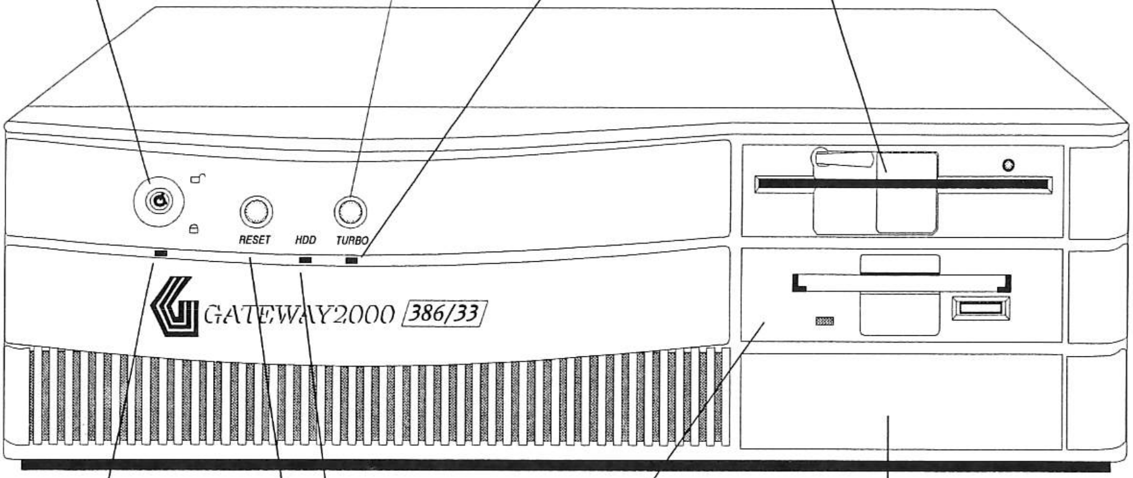
Power switch.

Video cable.
The cable is permanently attached to this monitor; it is packed separately with some other monitors.

Horizontal Phase.
Adjusts the horizontal position of the picture.

Vertical Size.
Adjusts the vertical size of the picture.

Figure 2-1. Gateway 2000 CrystalScan monitor: front and rear views.



Keyswitch.
Locks keyboard and case.

Turbo switch.
Toggles between fast and slow CPU clock speed *after* you have enabled the switch by pressing <Ctrl>, <Alt>, and the keypad <-> simultaneously.

Turbo indicator.
Lights when unit is in normal, high-speed mode.

5.25-in floppy disk drive.
The top drive in the system is usually drive "A."

Power on indicator.
Lights when system power is on. The power switch is to the rear on the right side of the system.

3.5-in floppy disk drive.
The second drive in the system is usually drive "B."

HD access indicator.
Flashes when system accesses hard disk. Never shut down the system while this indicator is lit or flashing!

Option bay.
An optional hard disk drive or tape backup system can be installed here; additional drive bays are hidden behind the front panel.

Reset switch.
Reboots computer; same as pressing <Ctrl> , <Alt>, and <Del> simultaneously, except starts *before* memory check.

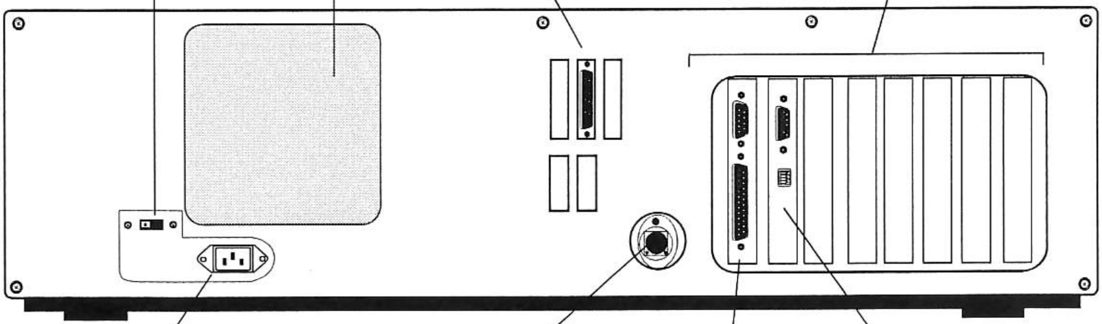
Figure 2-2. Gateway 2000 386/33 desktop system: front view.

Fan outlet.
Hot air from system exhausts here. Do not block!

Voltage selector switch.
Select between 110 and 220 VAC operation. System is shipped set for 110 VAC.

.I/O connectors.
If your system has an I\O adapter card, a second serial port may be installed here.

Expansion slots.
Various options (modems, bus mouse cards, MIDI adapters and so forth) are installed in these slots.



Power cable connector.
Attach the supplied power cable here.

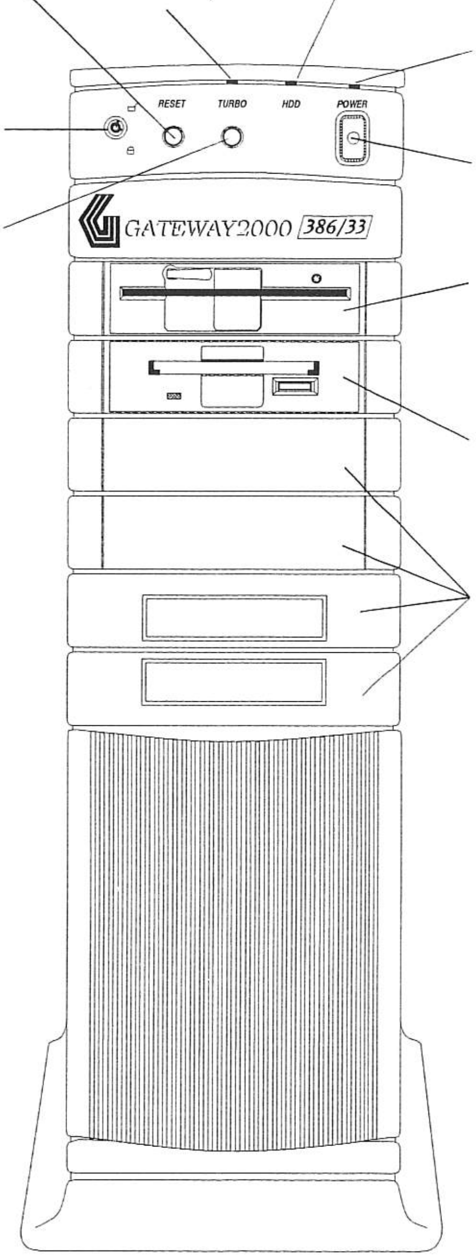
Keyboard connector.
Attach the connector from the keyboard cable here.

Video display adapter card.
Attach the video cable to the mating jack on this card.

IO adapter card.
The top connector on this card is a serial connector (usually COM1); the bottom is a parallel connector (usually LPT1).

WARNING!
To avoid damage to your computer and peripherals, never plug in or unplug a cable when the system unit power is ON. Always shut off the system, and then make any necessary cable changes.

Figure 2-3. Gateway 2000 386/33 desktop system: rear view.



Reset switch.
Reboots computer; same as pressing <Ctrl> , <Alt>, and <Del> simultaneously, except starts from memory check.

Turbo indicator.
Lights when system is operating at highest available CPU speed.

HD access indicator.
Flashes when system accesses hard disk. Never shut down the system while this indicator is lit or flashing!

Keyswitch.
Locks keyboard.

Turbo switch.
Toggles between fast and slow CPU clock speed *after* you have enabled the switch by pressing <Ctrl>, <Alt>, and the keypad <->
simultaneously.

Power on indicator.
Lights when system power is on.

Power switch.
Push until indicator light is lit to power on system.

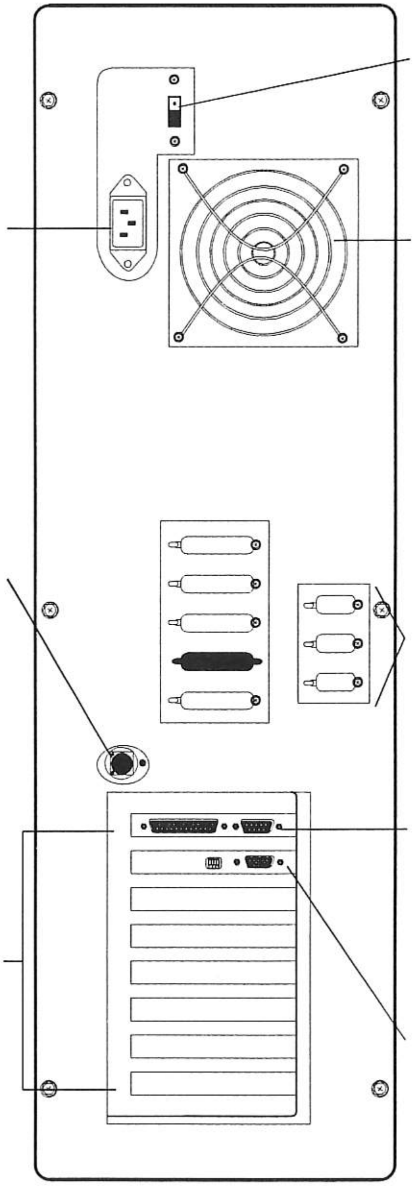
5.25-in floppy disk drive.
The top drive in the system is usually drive "A."

3.5-in floppy disk drive.
The second drive in the system is usually drive "B."

Option bays.
Optional hard disk drives or tape backup system can be installed here.

Figure 2-4. Gateway 2000 386/33 tower system: front view.

WARNING!
To avoid damage to your computer and peripherals, never plug in or unplug a cable when the system unit power is ON. Always shut off the system, and then make any necessary cable changes.



Voltage selector switch.
Select between 110 and 220 VAC operation. System is shipped set for 110 VAC.

Power cable connector.
Attach the supplied power cable here.

Fan outlet.
Hot air from the system exhausts here. Do not block!

Keyboard connector.
Attach the connector from the keyboard cable here.

I/O connectors.
If your system has an I\O adapter card, a second serial port may be installed here.

I/O adapter card.
The right connector on this card is a serial connector; the left is a parallel connector.

Expansion slots.
Various options (modems, bus mouse cards, MIDI adapters, and so forth) can be installed in these slots.

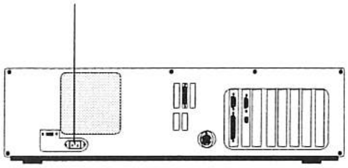
Video display adapter card.
Attach the video cable to the mating jack on this card.

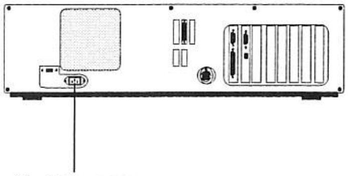
Figure 2-5. Gateway 2000 386/33 tower system: rear view.

Setting up the system for the first time

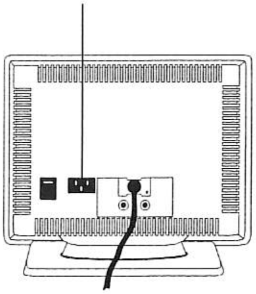
▶ To set up your system:

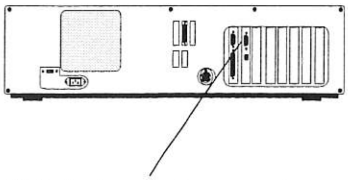
Make sure that the voltage switch is set appropriately for your location. The system is shipped set for 110 VAC.





Mains power connectors

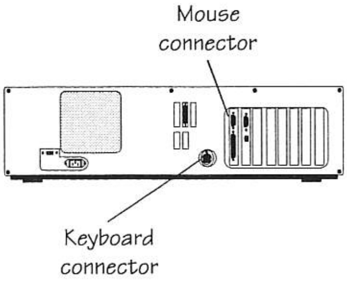




VGA display adapter connector. The monitor needs an analog VGA interface.

1. Take a moment to familiarize yourself with the front and back of the system unit and the monitor, as shown in Figures 2-1 through 2-5.
2. Put the system unit on the table. Make sure the line voltage selector on the rear panel is set correctly (110V in the US and Canada). Check the power switch and make sure that it is in the 0 (OFF) position. Connecting peripherals while the power is on can damage the system.
3. Remove the cardboard inserts from the 5.25-in disk drives. Keep them with your computer, and reinstall them to protect the drive's heads against damage whenever you move the system unit.
4. Place the monitor anywhere you like, as long as the video cable can reach the matching connector on the system unit.
5. Find the power cable for the system unit. Plug one end into the power connector on the rear of the system unit, and the other end into a ***grounded*** power strip or outlet. To protect your system and the data stored in it, we recommend that you also install a line noise filter/surge protector between the power source and the computer.
6. Locate the monitor power cable. Plug it into the power outlet or line filter. Plug the other end into the monitor (some monitors have a permanently attached cable).
7. Locate the video cable. Connect the monitor to the display adapter video connector on the back of the system unit. Connect the other end of the video cable to the monitor (some monitors have a permanently attached video cable). The video cable is provided with screws for secure connection.

If you have difficulty making the video connections, refer to Chapter 9, "Video Display and Display Adapter" in this manual and the manual supplied with the monitor before continuing on.



8. Locate the mouse cable. Plug it into the matching connector on the back of the system unit. The mouse cable is provided with screws for secure attachment.
9. Locate the end of the keyboard cable. Orient the plug to mate with the notch in the system unit's jack and plug in the cable.

Environmental considerations

Your Gateway 2000 386/33 computer system has been engineered to provide many years of reliable service. However, you should give it the same reasonable care and protection that you would any other piece of electronic equipment.

The system unit requires good ventilation. Place it where air can circulate freely around it, and avoid locations in direct sunlight or near heaters or lamps. *Never block the rear-panel cooling fan opening.* To prevent fire or shock hazard, do not expose the computer to rain, snow, or moisture. Finally, avoid locations with high levels of dirt, dust, or smoke.

Electrical Protection

Electrical surges and spikes can cause serious damage to your system. Use a power filter/surge protector on the system unit *and everything connected to it* as shown in Figure 2-6. If just one peripheral is not connected to a filter, the ability of the filter to protect your system is compromised — damaging spikes can enter the system through the unprotected peripheral, and then damage anything that is connected to it.

A power filter provides protection against many types of voltage spikes that can ride in on the power line and damage your system, but it isn't much help against lightening. If severe weather or an electrical storm threatens, it's a good idea to unplug the entire system from the power ***and telephone lines*** before the storm starts. (Lightening can ride in on the phone line connected to your modem and destroy the modem ***and*** the system unit connected to it).

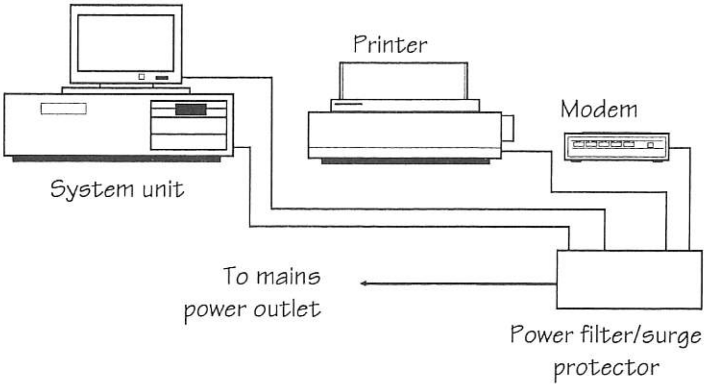


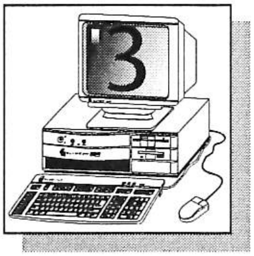
Figure 2-6. Connecting a power filter/surge protector to your 386/33 system. The power cable from every component in the system goes to the filter, which must be connected to a grounded power outlet.

Continuing On

This completes the basic setup. You may also have a printer, scanner, mouse, modem, MIDI card or other peripherals to install, but it is best to get the basic system up and running properly before connecting accessories.

Check your connections, and then continue on with the next chapter.

Using the System



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Powering up the system for the first time

▶ To power up ("boot") the system:

1. Power up the monitor first. (Read the monitor's manual if you don't know how.)
2. Remove any floppy disks from the drives. Power up the system unit by setting the power switch to the ON position. Listen for a whirring noise as the power supply fan turns on and the hard disk spins up to speed.
3. The three indicators on the upper right corner of the keyboard flash briefly and then go out, except for the Num Lock indicator, which stays on.

> ***Note:*** The exact messages which appear on the display during the power up procedure may be different from what we show here, depending on the BIOS revision and display adapter installed in your particular system.

4. Various BIOS version number messages appear on the display. For example:

```
SpeedSTAR VGA Vers. 4.23   (c)Diamond Computer Systems, Inc.
1MB display memory installed
Phoenix 80486 ROM BIOS PLUS Version 1.10 G14
Copyright (C) 1985-1990 Phoenix Technologies Ltd.
All Rights Reserved
```

   If the messages appear dim, adjust the brightness and contrast controls on the monitor.

> ***Important:*** Avoid turning the system on and off frequently, since a large percentage of failures occur during power up.
>
> When restarting the system, use the reset button instead of flipping the power switch on and off.
>
> Never turn the system unit off when the hard disk access indicator is lit.
>
> After shutting the system off, do not turn it back on again until the hard disk has come to a complete stop.

5. The amount of RAM installed in the system unit is displayed as the system performs some basic tests.
6. The system now loads the disk operating system (DOS) from the hard disk drive into RAM. After loading DOS, it automatically checks the root directory for a file named CONFIG.SYS, and executes the commands it finds in the file.
7. After the system executes the CONFIG.SYS commands, it automatically checks the root directory for a file named AUTOEXEC.BAT, and executes the commands it finds there.
8. If you purchased Windows with your system, Windows loads automatically. To learn about Windows, read the *Microsoft Windows User's Guide* included with your system.

If the computer doesn't work:

If the system does not power up as described here, review the setup procedure to make sure that you made all the connections properly. For more help, refer to the troubleshooting section in Chapter 12.

What's on your system's hard disk

We installed several directories and files on your hard disk before shipping your system. To find out what is on your hard disk:

1. Start up the system and exit Windows.
2. Go to the C:\> prompt and type:

   ```
   DIR <Enter>
   ```

3. A list of several directories appears on the display, similar to the following:

   ```
          Volume in drive C has no label
    Volume Serial Number is 1823-07C8
    Directory of  C:\

   COMMAND  COM      47845 04-09-91   5:00a
   DOS          <DIR>      08-28-91  12:49a
   CONFIG   SYS        141 08-12-91  11:00a
   WINA20   386       9349 04-09-91   5:00a
   MOUSE    SYS      31701 05-01-90   3:00a
   AUTOEXEC BAT        112 08-21-91   4:33p
   ROOT         <DIR>      08-28-91  12:51a
   WINDOWS      <DIR>      08-28-91  12:53a
   STAR         <DIR>      08-28-91   7:09a
   ANYKEY       <DIR>      08-28-91   7:10a
          11 File(s)  201744384 bytes free
   ```

   These directories contain the MS-DOS operating system, Windows, and various utility programs which you may find useful.

4. If your system uses DOS 5.0 or 4.01, the hard disk is accessed as drive C:, and is set up as one large partition.

   If you are new to the MS-DOS operating system, we recommend that you read the *MS-DOS User's Guide and Reference* before continuing.

How to exit Windows

To exit Windows, go to the **File** pull-down menu option in the Program Manager window. Click on the **Exit Windows** option. You are asked if you want to exit Windows. Click on **Yes**. You are now at the DOS prompt, which will probably look like this:

```
c:\windows
```

Type cd\ and press Enter to return to the c:\ root directory.

If these instructions are confusing, this would be a good time for you to read through the *MS-DOS User's Guide* included with your system.

About CONFIG.SYS and AUTOEXEC.BAT

When you power up your system, it loads DOS and then looks for two files (AUTOEXEC.BAT and CONFIG.SYS), and executes the commands it finds in them.

AUTOEXEC.BAT is a *batch file* (a file that contains a series of commands). These commands let you customize the way your computer starts up, loading software applications, TSRs, and drivers for peripherals. Your system was shipped with a very basic AUTOEXEC.BAT file. You can customize the file and add more commands to meet your particular needs. For example, you could add a command that tells the system to automatically load your word processing program when you turn on the system's power switch. Some applications automatically add new commands to AUTOEXEC.BAT when you install them on your hard disk.

CONFIG.SYS contains commands that load drivers for peripherals, and can be used to adjust the way your system's RAM is accessed; you can customize this file too.

You can edit these files by loading them into a word processor that reads and saves ASCII files. Changes you make to them don't actually take effect until you restart the computer (by pressing the front panel RESET button, or pressing the Ctrl, Alt, and Del keys simultaneously).

If you make a mistake in the either of these files, your computer may no longer be able to boot from the hard disk. To correct this problem, put a bootable floppy disk containing MS-DOS in drive A and reboot the system. Then go to the file you changed and correct the problem.

For more information about the AUTOEXEC.BAT and CONFIG.SYS files, refer to the *MS-DOS User's Guide and Reference* manual included with your system.

Using the system setup program

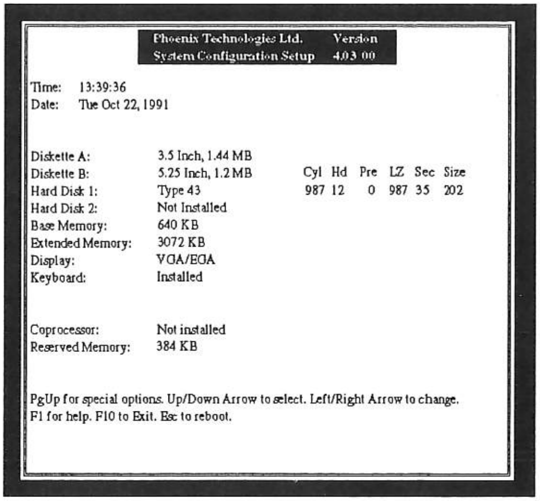
Note: If your system "forgets" the date and time and/or information about the system's setup when it is shut off, the batteries inside the system unit may need replacement. If your system has a single battery, replace the battery with a unit of the same voltage. If the system has a battery pack, install a fresh set of Alkaline AA cells in the pack.

The system setup program is stored in ROM on the system board. The settings you select with it are stored in RAM. As long as the system board battery is connected and functioning, the settings are retained.

Use the setup program to change the date and time, activate and deactivate the internal and external cache, set the CPU speed, relocate the system BIOS, and set parameters for the floppy and hard disk drives connected to the system. If you have just installed your computer system, it is a good idea to check the setup program parameters.

▶ To access the setup program:

1. Start up the system. At the DOS prompt, press the Ctrl, Alt, and Esc keys simultaneously to enter the setup program. The following screen appears on your display:



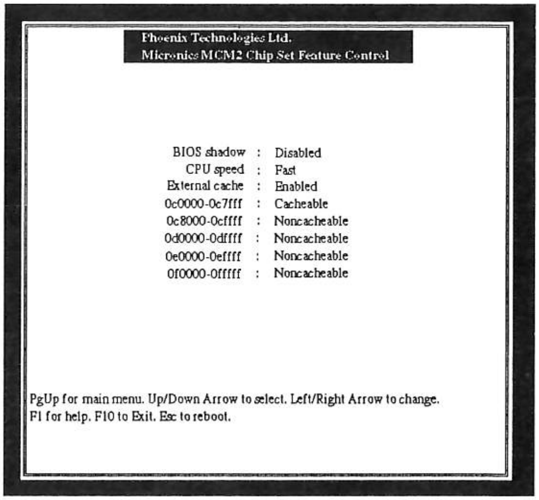
```
                    Phoenix Technologies Ltd.      Version
                    System Configuration Setup     4.03 00

Time:     13:39:36
Date:     Tue Oct 22, 1991


Diskette A:          3.5 Inch, 1.44 MB
Diskette B:          5.25 Inch, 1.2 MB        Cyl  Hd  Pre  LZ  Sec  Size
Hard Disk 1:         Type 43                  987  12   0  987  35   202
Hard Disk 2:         Not Installed
Base Memory:         640 KB
Extended Memory:     3072 KB
Display:             VGA/EGA
Keyboard:            Installed


Coprocessor:         Not installed
Reserved Memory:     384 KB


PgUp for special options. Up/Down Arrow to select. Left/Right Arrow to change.
F1 for help. F10 to Exit. Esc to reboot.
```

2. Use the arrow keys to move about the screen. Table 3-1 describes the System Configuration Setup screen.

Table 3-1. System Configuration Setup Screen.

Parameter	Description
Time:	Sets the system clock timing, using 24-hour format (1:00 pm = 1300 hours). Use the left arrow key to decrease the number; use the right arrow to increase the number. To move the cursor forward, use the down arrow key; to move the cursor backward, use the up arrow key.
Date:	Sets the system clock date.
Diskette A:	Specifies the size and capacity of the floppy disk drive installed as drive A.
Diskette B:	Specifies the size and capacity of the floppy disk drive installed as drive B. If only one floppy disk is installed in the system unit, set this option to *Not Installed.*
Hard Disk 1:	The drive type is refers to a combination of drive parameters; it is ***not*** the number of MB of your hard disk! For SCSI disks, set the drive type to *Not Installed.* For ESDI hard disks, set the drive type to *1*. Refer to Chapter 6 in this book for more information about hard disks.
Hard Disk 2:	If your system has two hard disk drives, use this option to set the drive type for the second hard disk drive. If only one hard disk is installed, set this option to *Not Installed.*
Base Memory:	This option is provided for information purposes and cannot be adjusted.
Extended Memory:	This option is provided for information purposes and cannot be adjusted.
Display:	Set this option to match the type of display adapter installed in the system unit. Most systems should be set to *VGA/EGA.*
Keyboard:	This option should always be set to *Installed.*
Coprocessor:	This option indicates whether or not a numeric coprocessor option is installed on the system board.
Reserved Memory:	This option is provided for information purposes and cannot be adjusted.

The setup program has a second page of options, referred to as the CMOS Extended Screen. You can toggle between the two screens with the PgUp key.



```
Phoenix Technologies Ltd.
Micronics MCM2 Chip Set Feature Control

  BIOS shadow  :  Disabled
    CPU speed  :  Fast
External cache :  Enabled
0c0000-0c7fff  :  Cacheable
0c8000-0cffff  :  Noncacheable
0d0000-0dffff  :  Noncacheable
0e0000-0effff  :  Noncacheable
0f0000-0fffff  :  Noncacheable

PgUp for main menu. Up/Down Arrow to select. Left/Right Arrow to change.
F1 for help. F10 to Exit. Esc to reboot.
```

Table 3-2 describes the options available from the Extended Setup Screen.

Table 3-2. Extended Setup Screen.

Parameter	Description
BIOS shadow:	Choosing *Enabled* relocates the system's BIOS and video BIOS into RAM for faster execution. This allows you to take advantage of the high speed 70ns RAM. However, if you have more than 16MB of RAM installed in your system, you cannot relocate the BIOS; the BIOS shadow option in the setup program must be set to *Disabled.*
CPU speed:	To maintain software compatibility with games and some old software programs, the CPU in your system can be slowed down. If the setup program's CPU Speed option is set to *Fast*, the system operates at its fastest speed when it is powered on. If the setup program's CPU Speed option is set to *Slow*, you can toggle the system between fast and slow operation with the front panel Turbo switch. Programs that require protected mode (such as Microsoft *Windows)* won't function properly at the slow speed. Do not slow down the CPU if it is not necessary to do so; the result is (at best) reduced performance, and could result in unpredictable behavior if you attempt to operate a protected mode program with the system running at slow speed.

Table 3-2. Extended Setup Screen (continued).

Parameter	Description
External Cache:	The Gateway 2000 386/33 system board has 64K of cache to enhance the performance of the system. Use this option to enable or disable the cache. This option should be left set to *enabled* unless you have a specific reason to change it.
0c0000-0c7FFF:	For maximum flexibility, we have provided five ranges of addresses that can be individually set to *Cacheable* or *Noncacheable.* This allows you to choose not to cache a range of addresses that should not be cached. This is necessary because you must not cache the address space used by certain expansion cards, such as I/O or network interface cards. (Only one address range is shown here, but there are five available in the setup program.)

After using the setup program, you won't need it again until one of the following occurs:

- ☐ An incorrect entry is made with the setup program
- ☐ You change your system's hardware configuration (change to a different hard disk, add memory, etc.)
- ☐ The backup battery fails or is disconnected.

When you boot the system after one of these conditions occurs, it asks if you want to run the setup program to correct the error. Follow the instructions which appear on the display.

Shutting down the system

Some users turn on their computer when they need it, and then shut it down immediately when they are finished with it. Other users leave their system on continuously, and never shut it down. We don't recommend either of these extremes.

We suggest that you turn the computer on at the beginning of the day, and shut it down at the end of the day.

▶ To shut down the computer system:

1. Exit any applications that are running.
2. Exit Windows.
3. Make sure that the hard disk activity LED is not lit or flashing.
4. Turn off the system unit first, and then the monitor.

About the keyboard

You communicate with your computer with the keyboard. With it, you type instructions and commands for the computer, and information to be processed and stored.

Many of the keys on your keyboard are like those on a typewriter; letter keys, punctuation keys, shift keys, a tab and the spacebar. Your keyboard also has many specialized keys which are not found on a typewriter:

- ☐ Function keys
- ☐ Numeric keys
- ☐ Arrow keys
- ☐ ALT
- ☐ CTRL
- ☐ DEL
- ☐ INS
- ☐ Home
- ☐ End
- ☐ Page up
- ☐ Page down
- ☐ Enter.

The job each of these specialized keys performs is determined by the software you are using. The instruction manuals for most software applications usually contain a section which describes the functions of each key or combination of keys.

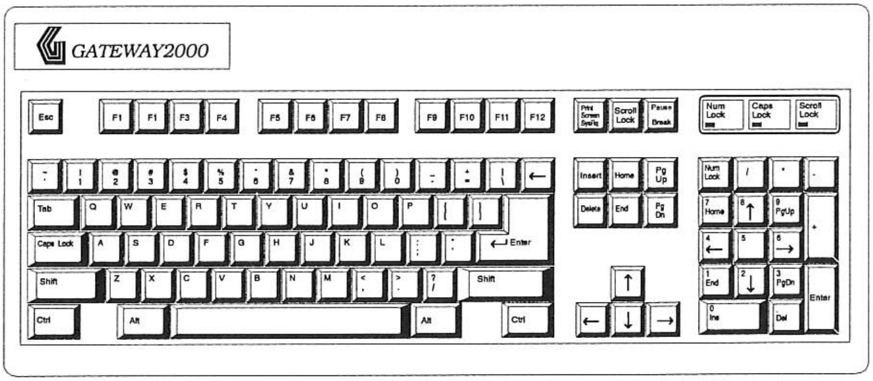


Figure 3-1. Gateway 2000 101-key keyboard.

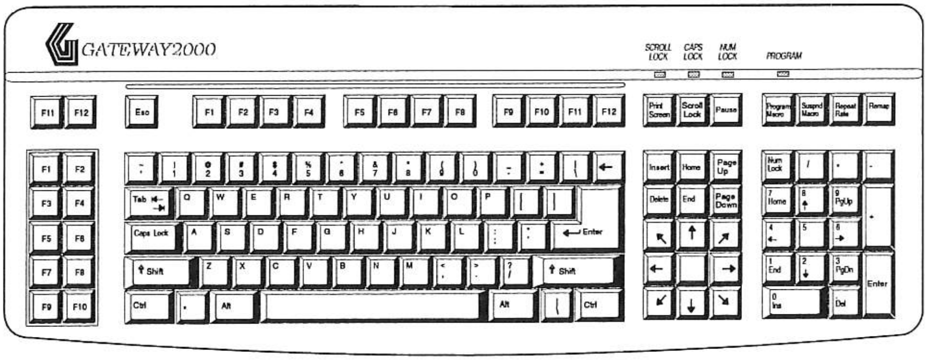
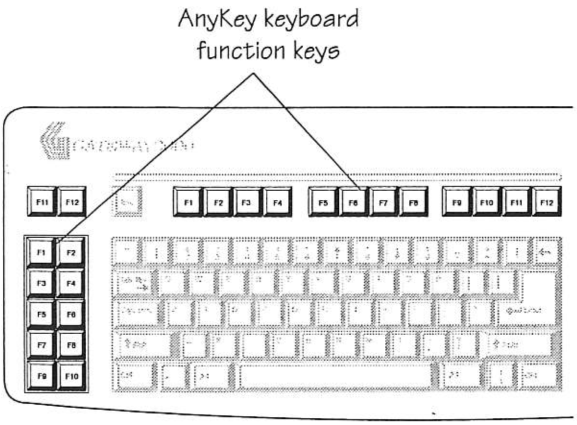


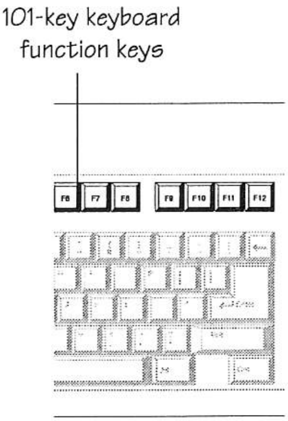
Figure 3-2. Gateway 2000 AnyKey keyboard.

Function keys

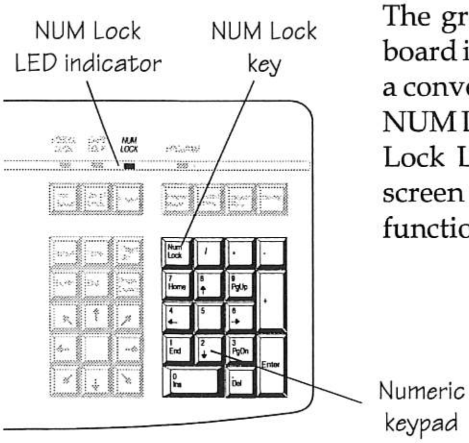
The function keys are located either across the top or on the left-hand side of the keyboard. Some keyboards have two complete sets of function keys.

Function keys send instructions to the software. Their exact function depends on the software package you are using. For example, many software packages use F1 to display Help information. Other packages use it for another purpose (or may not assign it a function at all).





Numeric keypad

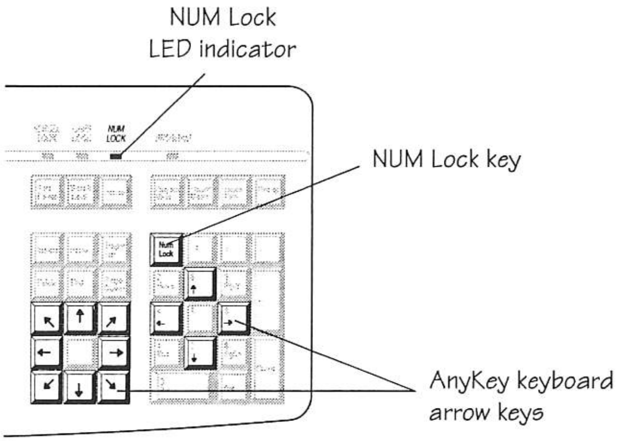


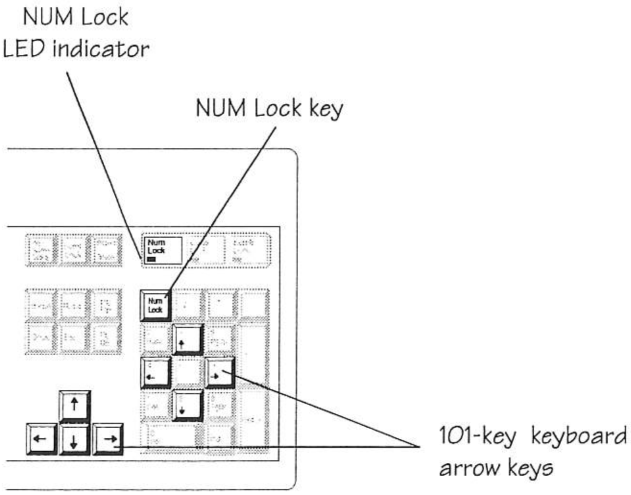
The group of keys on the right-hand side of the keyboard is called the *numeric keypad*. This keypad provides a convenient way to type numbers. You must press the NUM Lock key before using these keys. When the NUM Lock LED indicator light is ON, numbers appear on screen when you type them. When it is OFF, the keys function as arrow keys instead of numbers.

Arrow keys

The arrow keys help you move around the screen by changing the cursor position. Their exact function varies, depending on the software package in use.

The arrow keys are located directly to the left of the numeric keypad. You can use this set of arrow keys at any time; they have no relation to the NUM Lock key.



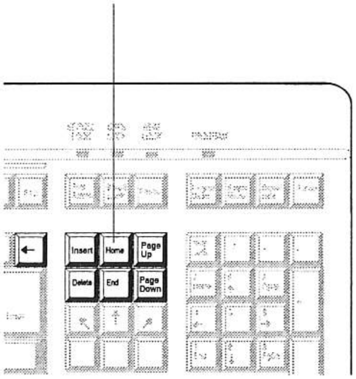


Additional keys

The last keys we'll discuss include:

BACKSPACE
INS
DEL
PAGE UP
PAGE DOWN
HOME
END.

Use the BACKSPACE, INS and DEL keys to edit text. PAGE UP, PAGE DOWN, HOME and END keys are usually used to move the cursor or scroll through information on the screen. As with other keys, your software determines what these keys do.


Additional keys

Using the AnyKey keyboard

> ***Note:*** This section explains how to use the Gateway 2000 AnyKey keyboard. If you didn't order this option with your system, skip ahead to the next chapter.

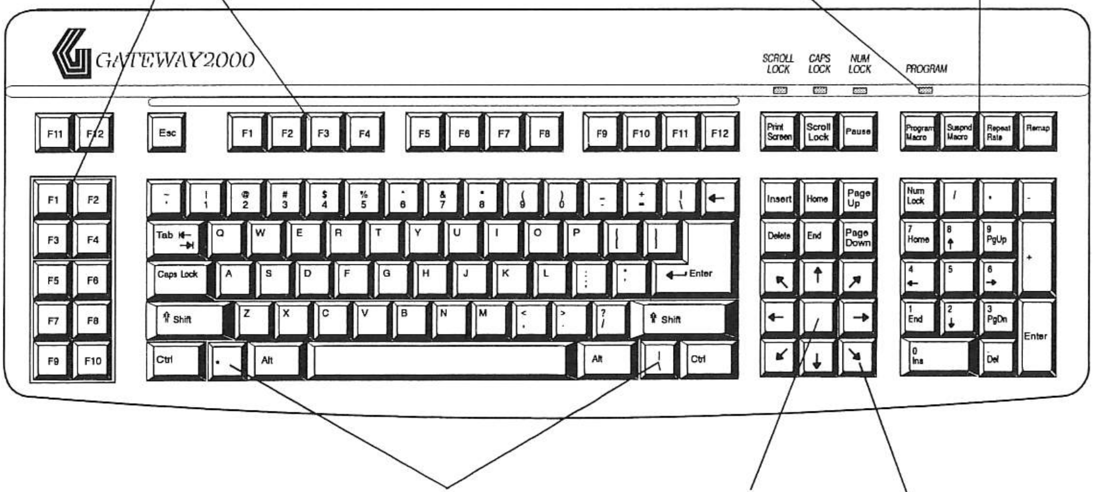
If you ordered the AnyKey keyboard with your system, you can program sequences of keystrokes (called *macros*) into a single key. When you press that key, the entire sequence of keystrokes is played back. For example, you might program one key to type a company name and address, and another to load a favorite program.

If you prefer a different arrangement of keys on the keyboard, you can rearrange the keys however you like. After you program macros and rearrange the keyboard to your liking, you can store the new configuration on

Two complete sets of Function keys.

Program LED flashes when AnyKey is in program mode.

These keys are used only for programming functions.



If you don't want an active key in this position, you may program it as a second Ctrl or Alt key.

This key is a second space bar; can be remapped.

The diagonal keys move your cursor in horizontal and vertical directions simultaneously.

Figure 3-3. Gateway 2000 AnyKey keyboard.

the system hard disk, and download the file again any time you need it. This capability allows you to choose between several different keyboard configurations.

▶ To store a macro in your AnyKey keyboard:

1. Press the Program Macro key. The Program LED begins flashing. (A flashing LED always indicates that you are in one of the keyboard programming modes.)
2. Press the key that you want to program.
3. Type the sequence of keystrokes to be stored in the key you selected. These keystrokes are sent to the computer and stored by the keyboard simultaneously. Thus, you can create a macro containing commands from within any program as you actually execute those commands.
4. When you finish entering the keystrokes to store in the macro, press the Program Macro key again. The Program LED stops flashing, indicating that you are back in the normal keyboard mode.

Note: You can program macros for any key on the keyboard, with the following exceptions: Shift, Ctrl, Alt, Print Scrn, Scroll Lock, Pause, Num Lock, Program Macro, Suspend Macro, Repeat Rate, and Remap. These keys cannot be programmed for macros.

However, you can use Shift, Ctrl and Alt as *modifiers* for the key you want to program the macro for. For example, rather than programming a macro for the F1 key, you can program Alt-F1 by holding down the Alt key at this stage, and then pressing F1. Note that the keystroke which selects the key where the macro will be stored does not get sent from the keyboard to the computer.

A macro programming example

This example describes how to program two macros.

1. At the DOS prompt, press the Program Macro key. The Program LED begins flashing.
2. Press the F1 key.
3. Type

   ```
   dir /w
   ```

   and press the Enter key.

4. Press the Program Macro key again. The Program LED stops flashing.
5. At the DOS prompt, press the Program Macro key a third time. The Program LED begins to flash again.
6. While holding down the Alt key, press F1.
7. Release the Alt key, and type:

   ```
   dir
   ```

   and press the Enter key.
8. Press the Program Macro key a fourth time. The Program LED stops flashing.
9. Now, test your new macros by pressing F1 and Alt-F1, and see what happens.

Erasing an existing macro

▶ **To erase a macro:**

1. Press the Program Macro key.
2. Press the key or combination of keys to erase.
3. Press the Program Macro key.

This restores the key to normal operation, as if it never had a macro in it. Of course, if a key has several macros stored in it with different Shift-Ctrl-Alt modifiers, only the macro with the modifier combination you specify is erased. The others are unchanged.

Writing over an existing macro

You don't have to erase a macro before programming a new macro into a key. If you want to put a new macro into a key, simply program it. If there was a macro there already, it is automatically erased. (Macros with different Shift-Ctrl-Alt modifiers attached to the same key are not changed.)

Shift key precedence

You may program up to four macros into any key. They are the unmodified key, and the key modified by the Shift, Ctrl, or Alt keys. The Alt key always takes precedence over Ctrl and Shift, and Ctrl always takes precedence over Shift. So, for example, if you tried to program a macro Ctrl-Alt-F1, it would be no different from Alt-F1, and any macro previously stored as Alt-F1 would be erased in the process.

Macros within macros

When in Program Macro mode, all macro play back is suspended. For example, suppose the key "t" had the macro "Hello" programmed into it. If you then attempt to program the F1 key with "This is a test", pressing the "t" key while programming generates "t" rather than the macro "Hello." Once you are done programming, the "Hello" macro is restored to the "t" key.

Playing back macros

To play a macro back, simply press the programmed key (using any necessary Shift, Ctrl, or Alt modifiers) any time the keyboard is in playback mode (that is, when the Program LED is on). Instead of sending the usual keystroke, the programmed key sends the sequence of keystrokes which was programmed into it.

Suspending macro playback

You can have the AnyKey keyboard send either the normal keystrokes, or macros. This lets you program macros into keys which you may need to use normally from time to time. For example, you may want to program macros for the function keys. However, when you use an application that also uses the function keys, you can turn all of the macros off to access the application's function key command set.

How to suspend macro playback

Your keyboard normally powers up with the macros available. This mode is indicated by a lit (but not flashing) Program LED. To turn playback mode off, press the Suspend Macro key. The Program LED goes off, and macros are not sent when a programmed key is pressed.

How to reactivate macro playback

To turn playback mode on again, press the Suspend Macro key when the Program LED is off. The LED lights and the keyboard resumes sending the macros programmed into any keys you press.

Erasing all program information in the keyboard

You can erase all macro and remap information stored in the keyboard at any time by holding down the Ctrl and Alt keys and then pressing the Suspend Macro key. The Program LED flashes for a few seconds while the keyboard erases all programmed information and reinitializes. When the LED stops flashing, the process is complete, and you may continue typing, reprogramming the keys, etc.

BE SURE YOU REALLY WANT TO ERASE YOUR KEYBOARD CONFIGURATION BEFORE YOU DO IT! You may throw away days or even weeks worth of macros if you don't save them before you erase.

Remapping keys

You can remap any key on the keyboard to any other position. Thus, if you don't like where any particular key on the keyboard has been placed, you can move it anywhere you want to put it.

▶ To remap a single key:

1. Press the Remap key. The Program LED begins flashing, indicating that you are in remap mode.
2. Press the key you want to move, and then press the key you want to move it to. The Program LED stops flashing for a moment to indicate that the key was successfully remapped.
3. At this point you can either proceed to remap another key, or you can exit remap mode by pressing the Remap key again. Upon exiting remap mode, the Program LED stops flashing.

Swapping two keys

Remapping a single key causes it to be doubled on the keyboard. For example, remapping "A" to "B" means that both the "A" and "B" keys will produce an "A" when pressed.

▶ **To swap two keys:**

To swap two keys, you simply remap them into each other. For example, first remap "A" into "B," and then remap "B" into "A."

Restoring a key to its original value

You can always restore a key to its original value by going into remap mode and pressing the key you want to restore twice (thereby remapping it into itself).

Macros and remapping precedence

When in Remap mode, all keys are temporarily returned to their original, unprogrammed and unremapped state. Thus, macros and previous remaps do not move with a key as it is remapped. For example, suppose the macro "This is a test" was programmed into the F1 key. If you then remap F1 into F2, the F2 key sends the F1 key when pressed, and not the macro "This is a test." The F1 key continues to send the macro.

Setting repeat rates

The AnyKey keyboard lets you select the rate at which keys repeat when they are held down. You may choose any one of eight different rates, ranging from 2 characters per second to 30 characters per second.

▶ **To set the repeat rate:**

1. Press the Repeat Rate key. The Program LED begins to flash.
2. When setting the repeat rate, function keys F1 through F8 in the top row produce the following repeat rates:

Key	Rate	Key	Rate
F1	2 cps	F5	10 cps
F2	3 cps	F6	15 cps
F3	5 cps	F7	20 cps
F4	7 cps	F8	30 cps

3. Press the function key that produces the rate you want. Then press the Repeat Rate key again. The Program LED stops flashing and the new repeat rate is set.

The ANYKEY upload/download utility program

The AnyKey keyboard lets you upload all remaps and macros to your computer, and save this configuration in a file. At a later date, you can download the file to the keyboard to restore the original configuration. This makes it possible to create unique keyboard configurations for different applications programs, or to share a single keyboard with several users, allowing each user to have their own keyboard configuration.

Running the utility program

The ANYKEY utility program can be used as an interactive program which displays menus and requests user input to perform each of its functions, or it can be called with command line parameters to perform a specific function. The command line approach is convenient if you know exactly what you want to do, and would prefer to save a few keystrokes, or if you want to incorporate an upload or download into a batch file.

Using the interactive mode

To use the utility program in the interactive mode, exit Windows and go to the DOS prompt. Change to the ANYKEY directory on your hard disk, type:

```
ANYKEY
```

and press the Enter key.

A menu pops up, from which you can choose to Upload, Download or Verify a personality file.

Using the command line mode

To use the ANYKEY program in the command line mode, you should put two parameters on the command line. First, you need a single letter, U, D, or V, to tell the program to Upload, Download, or Verify, respectively. Secondly, you need a personality file name for the ANYKEY program to act on. For example, if you type:

```
ANYKEY U STANDARD.KBD
```

and press the Enter key, the ANYKEY program uploads the keyboard personality and saves it in the file STANDARD.KBD.

The TUTOR program

The ANYKEY TUTOR program will lead you through all of the programming functions, step by step, to teach you how to use them. Just type TUTOR at the DOS prompt.

What to do if you have problems with the keyboard

If your AnyKey keyboard is not working properly, you may have programmed it incorrectly, or inadvertently tried to type with it in Remap Mode.

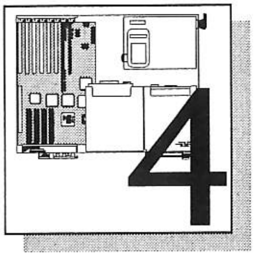
The first thing to press Ctrl-Alt-Suspend Macro to reinitialize the keyboard. If this does not work, your Ctrl or Alt key may have been remapped. Attempt to restore your Ctrl and Alt keys by pressing the Remap key; press Ctrl twice, press Alt twice, and then press Remap again. After you have done this, try Ctrl-Alt-Suspend Macro again.

Continuing on

Your basic setup is now complete. At this point, you should have a working computer system loaded with MS-DOS, Windows, and a few utility programs. Next, you may want to purchase and install one or more applications, such as a word processor, spreadsheet, data base manager, communications program, and so forth. Refer to the manuals supplied with the software applications for installation instructions.

If you encounter any problems, refer to Chapter 12, "Maintenance and Troubleshooting" in this manual.

Inside the Computer System



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Continuing on 4-12

Static electricity precautions

Many of the computer system's internal components are extremely sensitive to static electricity. The following precautions significantly reduce the possibility of damaging components with electrostatic discharge (static):

1. Before handling any components or touching anything inside the system unit, discharge your body's static electric charge by touching a grounded (earthed) surface. If the system unit is connected to a grounded outlet, you can do this by touching any part of the system's silver-colored chassis.
2. Do not remove cards or IC chips from their antistatic containers or bags until you are ready to install them. When removing cards or chips from a system, immediately place them in an antistatic bag.
3. When handling cards, hold them by their edges and their metal mounting bracket. Avoid touching components on the card and the edge connectors that plug into the expansion slots.
4. Do not slide cards or ICs over any surface.
5. Avoid plastic, vinyl, and styrofoam in your work area.

Introduction

Unlike many electronics devices, your Gateway 2000 386/33 computer system was designed to be "worked on" by you, its owner. Whether you need to install additional options, change jumper or switch settings, or just want to admire the system, you can open the case without angering the gods of warranty.

If you are unfamiliar with the hardware inside your computer system, this chapter offers a basic introduction. Later chapters give detailed information about each of the components in your system.

Opening the system unit case

▶ To open a desktop system unit case:

1. With the power cable disconnected, use a nutdriver or phillips head screwdriver to remove the screws shown in Figure 4-1.
2. Slide the case top forward. If the top sticks, grasp the lower right portion of the case just below the power switch, and pull it away from the chassis as you slide the case forward.
3. After sliding the case forward as far as it goes, pull it straight up.

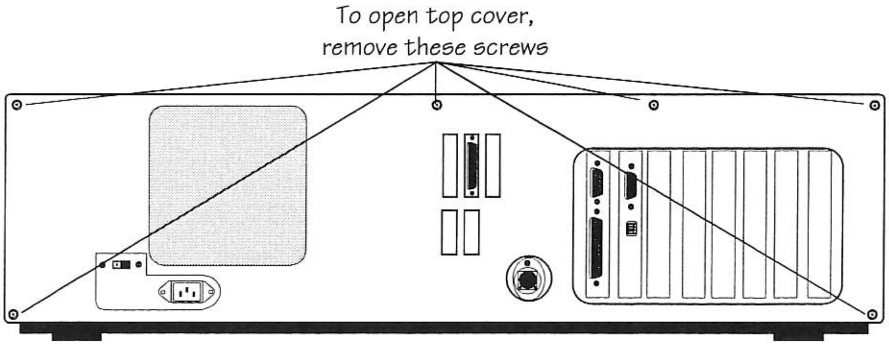


Figure 4-1. Screw locations on a desktop system unit.

To open a tower system unit case:

1. With the power cable disconnected, grasp the plastic rear cover panel and pull it off the chassis.
2. Use a nutdriver or phillips head screwdriver to remove the six screws shown in Figure 4-2.
3. Lift the cover off of the system unit.

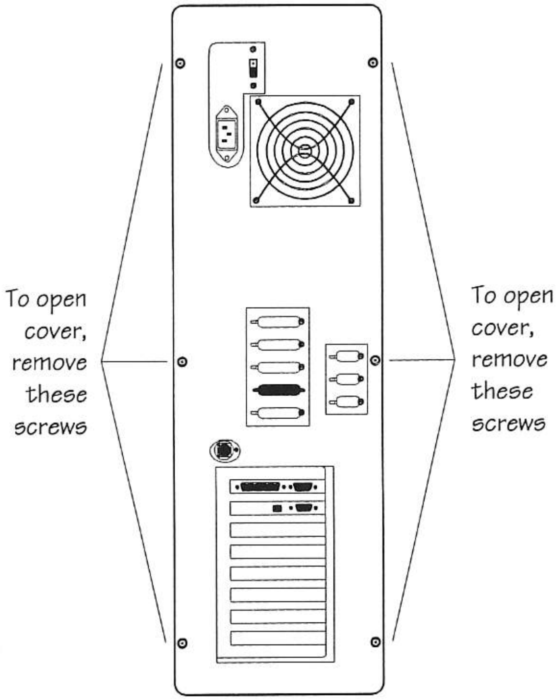

To open cover, remove these screws
To open cover, remove these screws

Figure 4-2. Screw locations on a tower system unit.

Warning! Disconnect the computer system from AC (mains) power before opening the cover.

Use only a three-wire grounded power outlet for the computer. Do not cut off or bypass the plug's grounding prong. Any attempt to operate or service the computer without an adequate ground may result in serious personal injury and/or damage to the system.

Inside a desktop system unit

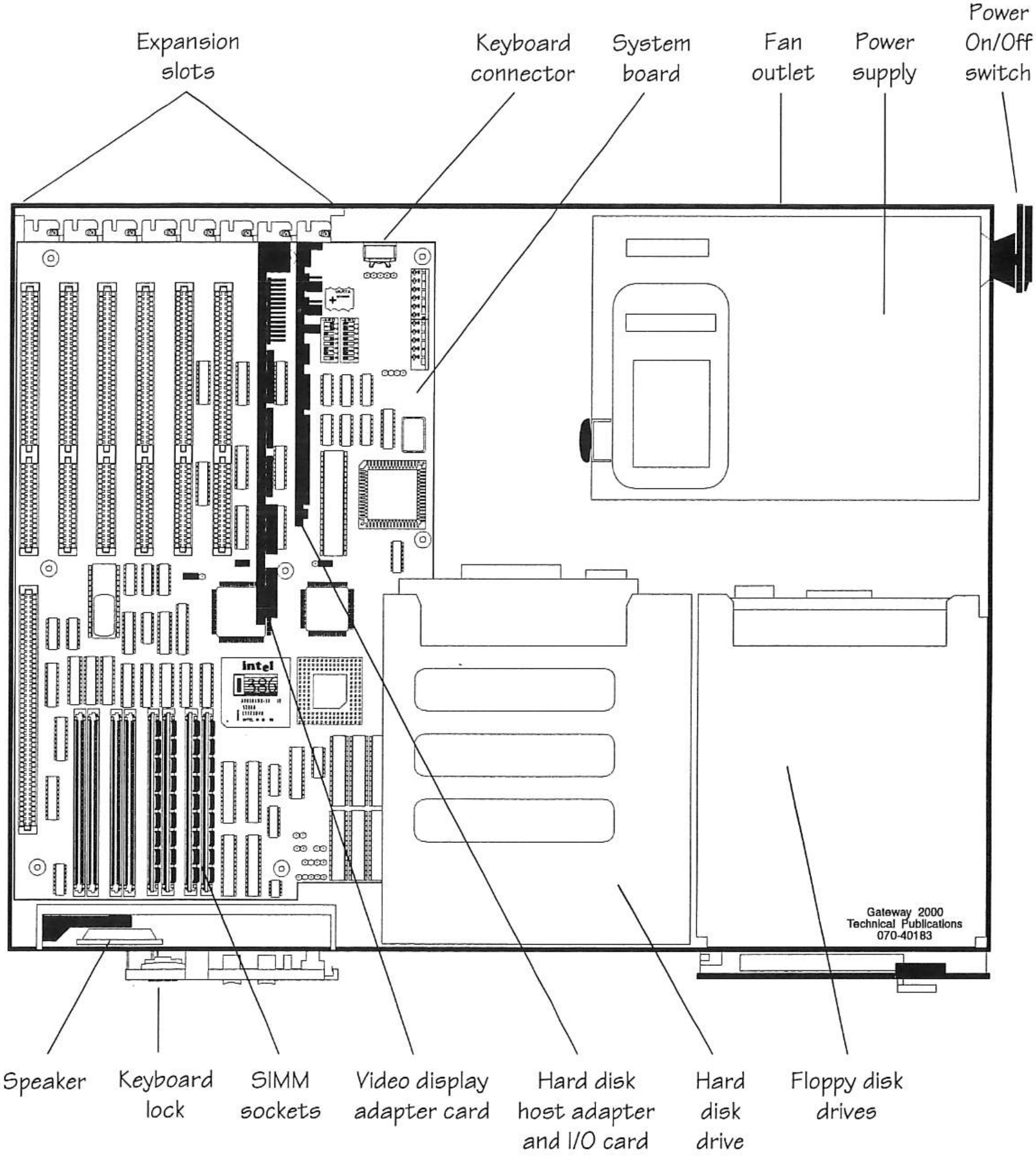


Figure 4-3. Inside a 386/33 desktop system unit. For clarity, cables are not shown.

Inside a tower system unit

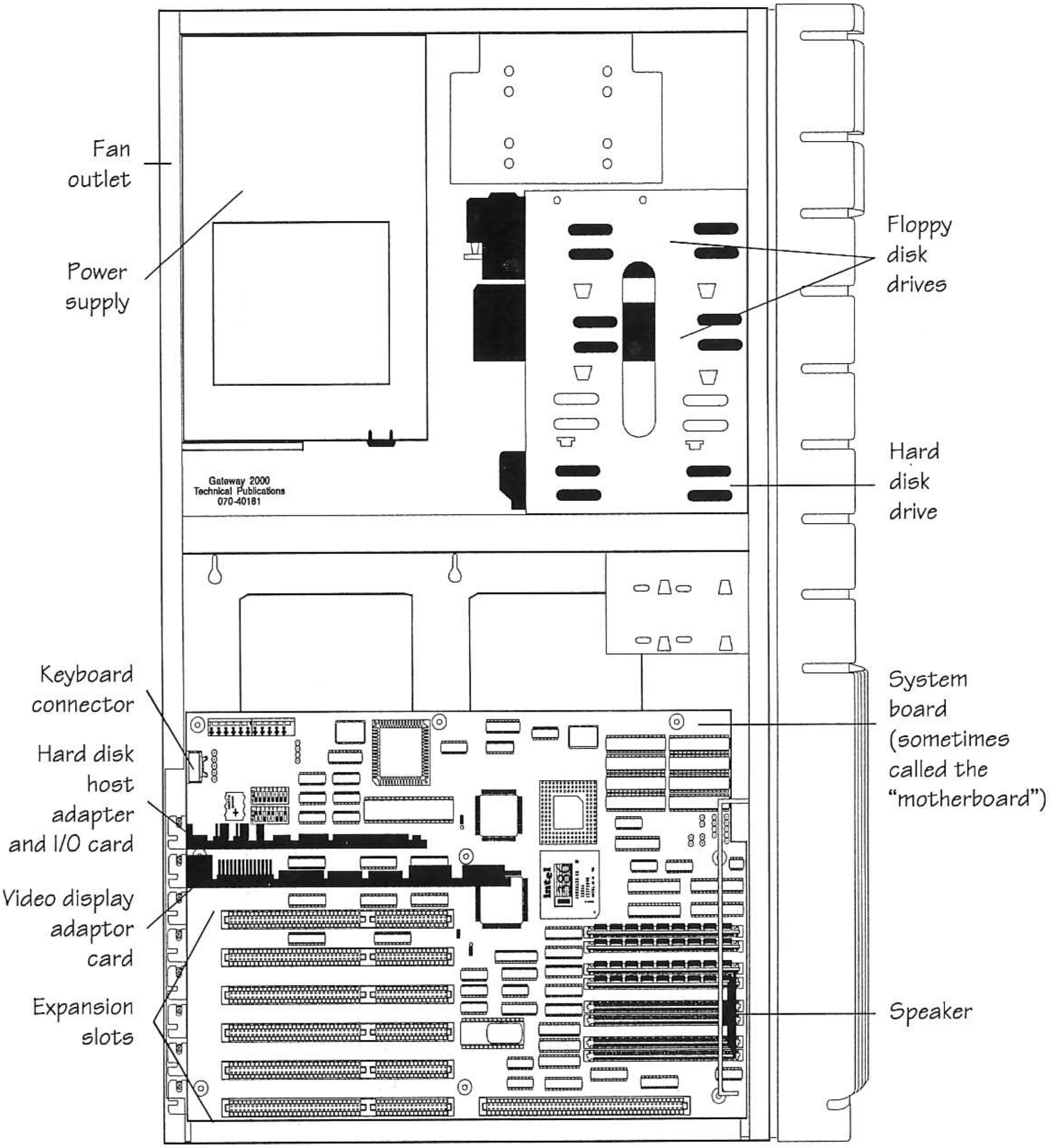
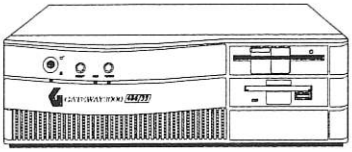
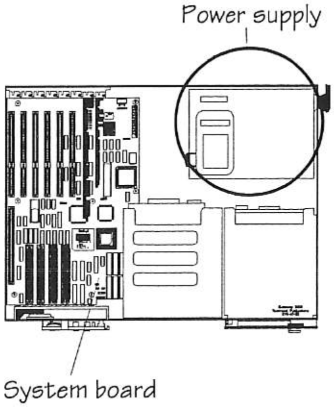

Fan outlet
Power supply
Keyboard connector
Hard disk host adapter and I/O card
Video display adaptor card
Expansion slots
Floppy disk drives
Hard disk drive
System board (sometimes called the "motherboard")
Speaker
Gateway 2000 Technical Publications 070-40181
intel 386

Figure 4-4. Inside a 386/33 tower system unit. For clarity, cables are not shown.

Power supply, system board, and battery pack

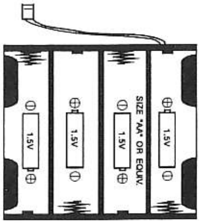


The *case* does more than just keep the system together in one place. Computers generate small amounts of radio frequency energy that can interfere with television and radio reception if not contained. The case keeps these emissions from escaping, and also protects the computer from *receiving* interference from CB, Amateur Radio, paging, public service, mobile telephone, and other radio transmitters.



The *power supply* converts the AC power from your wall outlet to the various DC voltages required by the system board, disk drives, and expansion cards. Gateway 2000 systems include large power supplies that easily handle as many accessories as you can install inside the system. The power supply connects to the system board with two cables; the black wires facing each other.

The *system board* is the large circuit board that covers most of the bottom of the chassis. It is the heart of the computer system, containing the CPU, the expansion slots, and the system's random access memory (RAM). Most importantly, it contains switches and jumpers that allow you to customize the system for optimum performance with your applications and accessories.

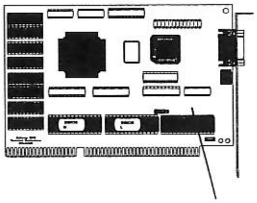


Your system is equipped with a *battery pack* that maintains setup information about your system in CMOS RAM. If the batteries in the pack fail, replace them with good quality Alkaline AA cells. The pack connects to the system board at J13 (see Chapter 5 for the location).

Drive bays

Every system contains several *drive bays*, which can hold accessories such as hard and floppy disk drives, and tape backup systems. Every item installed in a drive bay is connected to a controller card (via ribbon cable) and to the power supply.

Expansion slots and cards

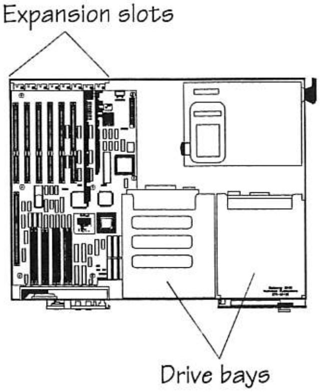


Typical expansion card

The eight *expansion slots* on the 386/33 system board are designed to hold standard *expansion cards*. The slots in your system are ISA-bus 16-bit slots, and can be used for either 8- or 16-bit expansion cards. One slot also accepts an optional 32-bit memory expansion card.

The *disk host adapter card* coordinates data transfer between the disk drives (both hard and floppy) and the system board.

The *I/O card* provides communications interfaces to other parts of your system, such as printers, plotters, and modems. If your system includes a hard disk drive with an IDE interface, the hard disk host interface electronics may be combined with the I/O card, so a separate host adapter card is not necessary.



The *video display adapter* interfaces the system board to your monitor. Disk host adapter cards and video display adapters are available in 8-bit and 16-bit versions. Best performance is obtained with the 16-bit versions.

All systems contain the cards listed above. Your system may contain other expansion cards: tape drive adapter, bus mouse card, scanner interface, MIDI adapter, or modem.

Avoiding expansion card conflicts

Before you install a new expansion card, you should do a little research. A bit of time spent here can save you a lot of troubleshooting in the long run! Most expansion cards require two types of system resources:

- ☐ Interrupts (also called IRQs)
- ☐ I/O addresses.

Many expansion cards have jumpers or switches which select interrupts and/or I/O addresses for the card. If these are not set correctly, the expansion card may conflict with another function in the computer. Most expansion cards are furnished with instructions that explain how to avoid these conflicts; follow their instructions carefully! The following information will help you avoid conflicts when installing expansion cards.

About interrupts

Some peripheral devices that are installed in your Gateway 2000 computer system unit use interrupts (IRQ's) to inform the computer that they are ready for instructions.

An interrupt is actually the suspending of microprocessor program execution by a demand for attention from a peripheral device. IRQ is an acronym for **I**nterrupt **R**e**Q**uest line. After the interrupt has been serviced, the suspended microprocessor task is resumed where it was broken off by the interrupt.

Table 4-1 lists the default assignments for hardware interrupts. Refer to it carefully before assigning or reassigning any interrupt when installing an expansion card. You should also check the computer's setup program to determine which interrupts are currently in use by the computer system for COM ports, LPT ports, and so forth.

Table 4-1. Standard interrupt assignments. If a particular interrupt is not in use in your system, you may assign it to something else. For example, If you don't have an second parallel port (LPT2) installed in your system, you can use IRQ5 for another expansion card.

In some cases, you can share an interrupt between two devices that won't be used at the same time (a printer port and tape backup unit, for example). ***However, this can create a variety of problems, and should be avoided if at all possible.***

***Note:** There are a few hard disk controllers that use interrupt 15 instead of interrupt 14.

Interrupt Number	Function/Assignment
NMI (Non-Maskable Interrupt)	Reports parity errors
0	System timer
1	Keyboard
2	Cascade input for second interrupt controller
3	COM2 PC network (alternate) SDLC/BSC
4	COM1/SDLC/BSC
5	Parallel port 2 - LPT2
6	Disk controller Hard disk and floppy disk drive
7	Parallel port 1 - LPT1
8	Realtime clock interrupt
9	Software redirected to interrupt OA Hex
10	Reserved
11	Reserved
12	Reserved
13	Coprocessor
14*	Hard disk controller
15*	Reserved

About I/O port addresses

Your Gateway 2000 system unit addresses both system memory and I/O through special lines or conductors called the *bus*. The bus carries codes, signals or power from the microprocessor to all parts of the system. I/O port addresses range from 0000h to FFFFh, for a total of 64K locations.

In any given memory segment, the microprocessor can address as many I/O locations as it can memory locations. Your system is able to access I/O devices through a broad range of addresses. Standard assignments for I/O port addresses have been established for many common input devices. Table 4-2 lists these address definitions.

Table 4-2. I/0 addresses and devices.

Base I/O Address*	Device
1F0 - 1F8	Fixed disk
200 - 207	Game I/O
278 - 27F	Parallel port 2 - LPT2
2E8 - 2EF	Serial port 4 - COM4
2F8 - 2FF	Serial port 2 - COM2
300 - 31F	Prototype or network card
360 - 363	PC network (low address)
368 - 36B	PC network (high address)
378 - 37F	Parallel port 1 - LPT1
380 - 38F	SDLC, Bisynchronous
3A0 - 3AF	Bisynchronous (primary)
3B0 - 3BF	Monochrome display and printer adapter
3C0 - 3CF	EGA/VGA
3D0 - 3DF	CGA/MCGA
3E8 - 3EF	Serial port 3 - COM3
3F0 - 3F7	Diskette controller
3F8 - 3FF	Serial port 1 - COM1

Installing optional expansion cards

Once you have set any jumpers or switches as described in the expansion card's instructions, you can install the card in the system unit.

▶ **To install an expansion card in the system unit:**

1. Power down the system and remove the system unit cover, as described earlier in this chapter.
2. Remove the screw securing the expansion port cover to the rear panel. Don't lose the screw!
3. Seat the expansion card firmly in the expansion slot.
4. Secure the card to the rear panel with the screw from step 2.
5. Replace the system unit cover.

About math coprocessors

The Intel 80387 math coprocessor is an extension to the 80386 microprocessor architecture. The combination of the 387 with the 386 microprocessor can dramatically increase the processing speed of application software packages which perform mathematical operations. This makes an ideal computer workstation platform for applications such as financial modeling and spread sheets, CAD/CAM, or graphics.

The 80387 math coprocessor adds over seventy mnemonics to the 80386 microprocessor instruction set. Specific 80387 math operations include logarithmic, arithmetic, exponential, and trigonometric functions. The 80387 supports integer, extended integer, floating point and BCD data formats, and fully conforms to the ANSI/IEEE floating point standard.

Note: The Weitek 3167 math coprocessor only speeds up mathematical calculations that use Weitek code.

The 386 system board can accomodate either the Intel 80387 math coprocessor or the Weitek 3167 math coprocessor. **However, a coprocessor is only of benefit if your application software is written to take advantage of it.** See your software manual to find out if a coprocessor would improve performance for you.

Installing a math coprocessor

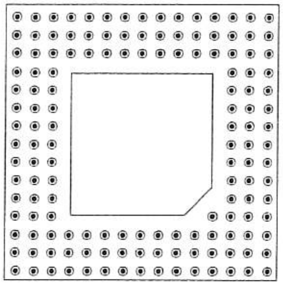


Figure 4-5. 121-pin PGA socket at location U45.

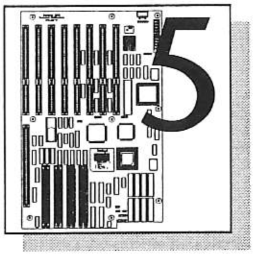
A math coprocessor chip may be inserted in the center of the 121-pin PGA Extended Math Coprocessor (EMC) socket at U45. Refer to Figure 5-1 for the exact location. This socket (shown in Figure 4-5) can hold the Intel 80387 chip or the Weitek 3167 chip. If you examine the socket, you'll notice that one corner is flattened. Line up the indentation or spot on the chip with the flattened corner of the socket, and gently plug in the chip. When the coprocessor is snapped in, it is ready to operate. The system automatically detects the math coprocessor, there are no dip switches to be set.

Caution: Make certain that the system unit power is OFF before installing or removing a math coprocessor.

Continuing on

The following chapters provide specific details about the various components in your system—system board, disk drives and controllers, memory expansion, video display adapters, and so forth.

The System Board



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System board DIP switch settings 5-4
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Installing additional memory (RAM) 5-6
    How to install SIMM memory modules 5-7
The M810 memory expansion card 5-8
Direct mapped cache 5-9

Introduction

The system board is the large circuit board that covers most of the bottom of the chassis, and it is the heart of your computer system. It contains the CPU, expansion slots, data bus interfaces, and main system memory (RAM) for your computer. Most importantly, it contains switches and jumpers that allow you to customize the system for optimum performance with your particular set of applications.

The Gateway 2000 386/33 system board includes the following features:

☐ Intel 33MHz 80386 Microprocessor chip with 32-bit architecture

☐ 64K direct mapped cache using 8K x 8 25ns SRAM

☐ On-board SIMM memory expandable from 1 MB to 32 MB; an additional 32 MB with optional M810 memory card

☐ I/O bus speed of 8.3 MHz for maximum compatibility with expansion cards

☐ Two CPU speed options (slow and fast) selectable from setup program

☐ System and video BIOS relocatable to 32-bit high speed RAM for enhanced execution

☐ Eight 16-bit ISA-bus expansion slots.

☐ Socket for Intel 80387 or Weitek 3167 math coprocessor.

The layout for the 386/33 system board is shown in Figure 5-1.

System board layout

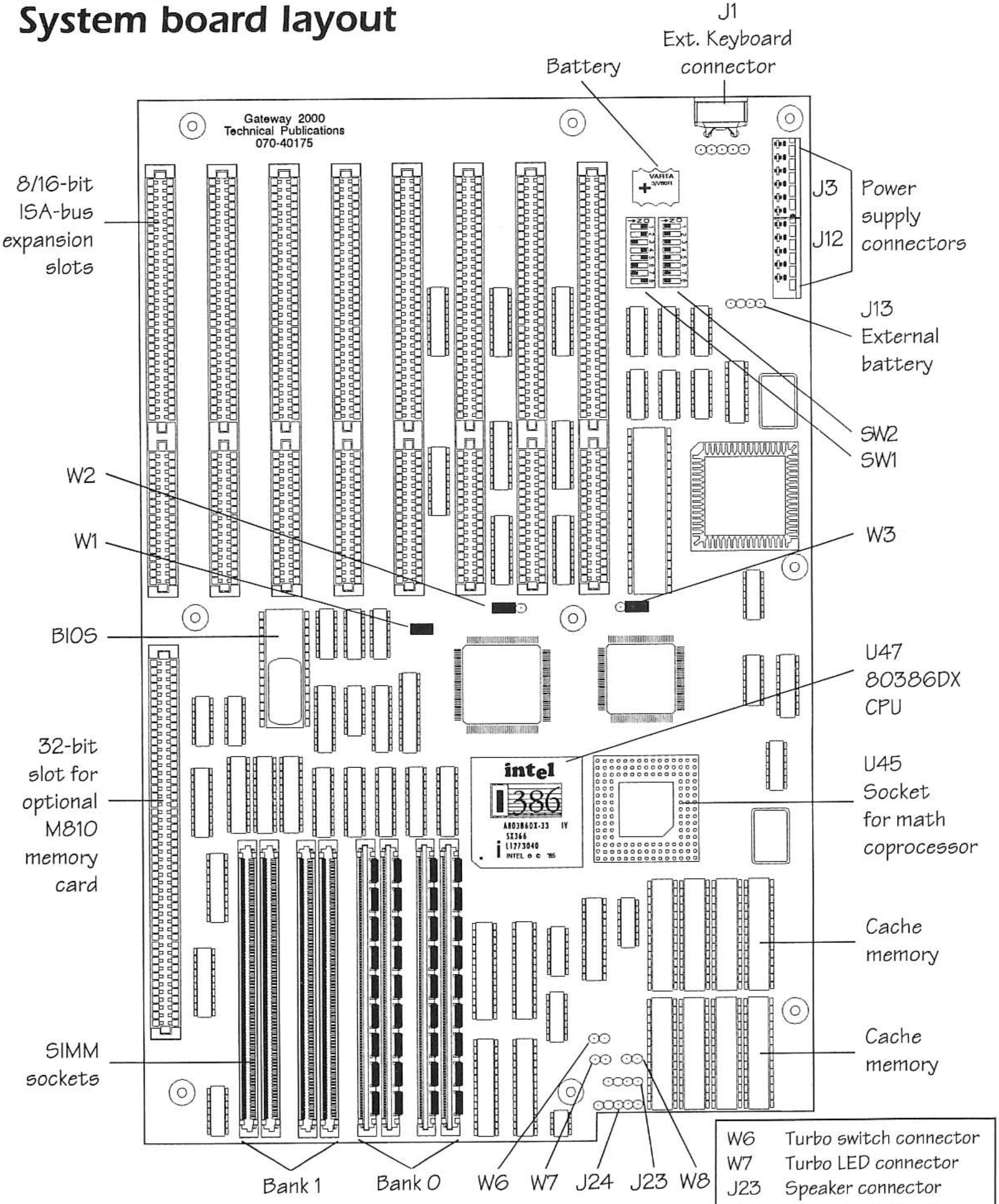


Figure 5-1. 386/33 system board.

W6	Turbo switch connector
W7	Turbo LED connector
J23	Speaker connector
J24	Keylock connector
W8	Reset connector

System board DIP switch settings

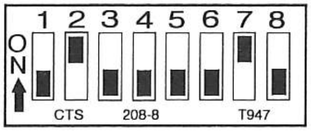


Figure 5-2. DIP switch bank.

The system board has two banks of DIP switches (similar to that shown in Figure 5-2) which you use to configure various options. The switches are located near the keyboard connector. The switch settings and their defaults are shown in Tables 5-1 and 5-2.

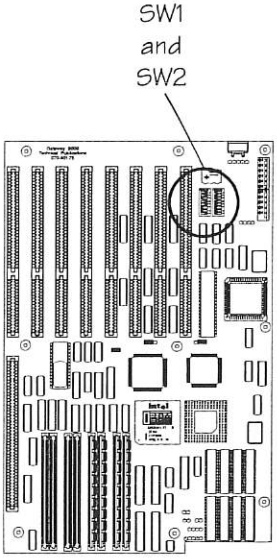


Table 5-1. SW1 DIP switch settings.

Switch	Configuration	Position
1	Memory Size	Refer to Table 5-1
2	Memory Size	Refer to Table 5-1
3	Memory Size	Refer to Table 5-1
4	Memory Size	Refer to Table 5-1
5	Memory Size	Refer to Table 5-1
6	Reserved	Off
7	Reserved	Off
8	Reserved	On

Table 5-2. SW2 DIP switch settings.

Switch	Configuration	Position	Default
1	Reserved	Off	*Off*
2	Reserved	Off	*Off*
3	Reserved	Off	*Off*
4	Reserved	Off	*Off*
5	Reserved	Off	*Off*
6	Video BIOS cacheable	Off	*Off*
	Video BIOS noncacheable	On	
7	Reserved	Off	*Off*
8	Reserved	Off	*Off*

Jumpers and connection points

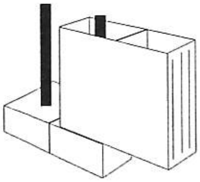


Figure 5-3. Two-pin jumper block.

Your Gateway 2000 386/33 system board has various jumpers and connectors which are set before bootup. A jumper is two or more gold pins which may or may not be covered by a plastic connector plug. (See Figure 5-3.) Jumpers are used to configure various system options and parameters. Connectors are used to connect the system board to other parts of the system. Each jumper and connector is marked in white on the system board. Refer to these markings to verify that you have the correct switch or jumper. Setting board options involves placing the jumpers on the designated pins and connectors as shown in Tables 5-3 and 5-4.

Table 5-3. Jumper settings.

Jumper	Configuration	Pin#	Assignment
W1	Reserved	Pins 1-2	*Default*
W2	Cache enabled	Pins 1-2	*Default*
	Cache disabled	Open	
W3	CGA/EGA/VGA	Open	
	Monochrome	Pins 1-2	

Table 5-4. Connection points.

Connector	Assignment
W6	Turbo switch
W7	Turbo light
W8	Reset switch
J13	External battery connection
J23	Speaker connector
J24	Keylock
J1 & J2	Keyboard connectors
J3 & J12	Power supply connectors

Installing additional memory (RAM)

Figure 5-4. 1MB x 9 SIMM.

There are a lot of good reasons why you should consider installing additional memory in your computer system. Many operating systems, graphics environments, and software applications run faster and more efficiently when large amounts of RAM (16+MB) are available. If you have a lot of RAM, you can create a large disk cache to speed up disk access, which in turn makes your system run much faster.

Your computer's system board holds between 1 and 32MB of RAM, using four standard 70 ns 30-pin SIMM memory modules like the one in Figure 5-4. Table 5-5 shows the possible memory configurations and switch (SW1) settings for each configuration.

Two banks of SIMM sockets are available on the system board. Each bank contains four sockets. If you use a bank at all, it must be filled.

You can use 256KB x 9, 1MB x 9, or 4MB x 9 SIMMs, but do not mix different capacity SIMMs in the same bank. (In other words, don't put 256KB x 9 and 1MB x 9 SIMMs in the same bank.) Also, ***don't mix SIMMs rated for different speeds on the same system board.*** Doing so can result in subtle and bizarre problems that are difficult to troubleshoot. We recommend that you use 70 ns SIMMs in this system.

How to install SIMM memory modules

Two banks of SIMM modules are available for use with SIMM memory modules. See Figure 5-1 for the location of the banks.

> ***Caution:*** Before handling and/or installing SIMMs, make certain that the area you are working in is static free. You should be grounded as well.

To install SIMM modules on the system board:

1. Insert each SIMM module into its socket as shown in Figure 5-5. The component side of the SIMM module must face the 386DX CPU chip.

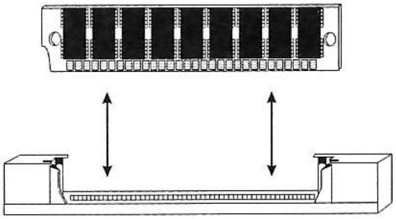


Figure 5-5. Installing SIMM memory modules.

2. Gently press the SIMM module straight down until it is inserted fully into the socket.
3. Following Table 5-5, set the switches in SW1 to match the amount of memory installed in the system.

To remove SIMMs from their sockets:

1. Gently pull up on the SIMM. If necessary, insert a tool such as a small punch or screwdriver through the holes on one end of the SIMM and pull upwards. Repeat on the other end.
2. To avoid breaking the socket, ***always loosen one side of the SIMM and then the other side before attempting to remove it.***

Table 5-5. Memory size select switch settings for SW1 on the 386/33 ISA system board.

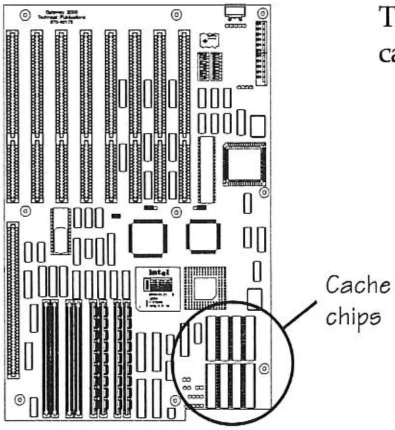
Memory	**Fill Bank #**								
Size	**0**	**1**	**2**	**3**	**SW1-1**	**SW1-2**	**SW1-3**	**SW1-4**	**SW1-5**
IMB	256K	--	--	--	ON	ON	ON	ON	ON
2MB	256K	256K	--		OFF	ON	ON	ON	ON
3MB	256K	256K	256K	--	ON	OFF	ON	ON	ON
4MB	256K	256K	256K	256K	OFF	OFF	ON	ON	ON
4MB	1MB	--	--	--	ON	ON	OFF	ON	ON
5MB	256K	1MB	--	--	ON	ON	OFF	OFF	ON
6MB	256K	256K	1MB	--	ON	OFF	ON	OFF	ON
7MB	256K	256K	256K	1MB	OFF	ON	ON	OFF	ON
8MB	1MB	1MB	--	--	OFF	ON	OFF	ON	ON
9MB	256K	1MB	1MB	--	ON	OFF	OFF	OFF	ON
10MB	256K	256K	1MB	1MB	OFF	OFF	ON	OFF	ON
12MB	1MB	1MB	1 MB	--	ON	OFF	OFF	ON	ON
13MB	256K	1MB	1 MB	1MB	OFF	OFF	OFF	OFF	ON
16MB	1MB	1MB	1 MB	1MB	OFF	OFF	OFF	ON	ON
16MB	4MB	--	--	--	ON	ON	OFF	ON	OFF
20MB	1MB	4MB	--		ON	ON	OFF	OFF	OFF
24MB	1MB	1MB	4MB	--	ON	OFF	ON	OFF	OFF
28MB	1MB	1MB	1MB	4MB	OFF	ON	ON	OFF	OFF
32MB	4MB	4MB	--	--	OFF	ON	OFF	ON	OFF
36MB	1MB	4MB	4 MB	--	ON	OFF	OFF	OFF	OFF
40MB	1MB	1MB	4MB	4MB	OFF	OFF	ON	OFF	OFF
48MB	4MB	4MB	4MB	--	ON	OFF	OFF	ON	OFF
52MB	1MB	4MB	4MB	4MB	OFF	OFF	OFF	OFF	OFF
64MB	4MB	4MB	4MB	4MB	OFF	OFF	OFF	ON	OFF

Banks 0 and 1 are located on the system board.
Banks 2 and 3 are on the optional M810 memory expansion card.

The M810 memory expansion card

To increase memory beyond 32MB, purchase the optional M810 memory expansion card. It plugs into the 32-bit expansion slot on the system board. With it, your system can have up to 64MB of RAM using 256K x 9, 1MB x 9, or 4MB x 9 SIMMs.

Direct mapped cache



The system board is equipped with 64K direct mapped cache using 8K X 8 25ns chips. This cache is not expandable.

Hard Disk Drive and Controller

6

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Introduction

You probably don't need the information presented in this chapter right now. Your Gateway 2000 system arrives from the factory with the hard disk and host adapter card already installed and configured.

As you become familiar with your system, you may find this chapter more useful. Perhaps you want to change the size or arrangement of the partitions on your hard disk. Or perhaps you purchased an additional hard disk and are ready to install it in your system. Whatever the reason, this is the place to look for hard disk information! This chapter contains:

- ☐ Instructions on how to install the hard disk drive and host adapter card
- ☐ Description of how to select the correct drive type in the system's setup program
- ☐ Instructions on how to partition and format the hard disk
- ☐ Troubleshooting information.

A note on terminology

Although the title of this chapter refers to the "hard disk drive and controller," this is not an entirely accurate description of the IDE hard disk subsystem installed in your system. IDE hard disks contain the controller electronics on the drive itself, and the card that connects the drive to the system board is a very simple interface card, which we call the *host interface card* or *paddle board.*

In your system, the host interface for the hard disk is combined on a single card with the circuitry for the serial and parallel ports.

Precautions

To avoid damaging the hard disk and voiding your warranty, observe these precautions when handling the drive:

- ☐ Do not drop or handle the drive carelessly.
- ☐ Protect the drive from moisture and extreme temperatures.
- ☐ Do not remove the drive from its antistatic bag until you are ready to install it. Discharge your personal static charge by touching a grounded surface before handling the hard disk or host interface card. Avoid touching the connectors and printed circuit board.
- ☐ Follow cabling instructions carefully.
- ☐ Never connect or disconnect disk drive cables while the system unit power is on.
- ☐ Always handle a drive by its frame. Do not touch the connectors or any components without first taking precautions against static electricity discharge.

Installing the hard disk and host adapter card

IDE drives require the following configuration, connection and installation activities, in the order listed:

1. Configure the hard drive for single or multiple drive operation.
2. Install the drive in the system unit.
3. Connect a four-pin system power supply cable to the drive's power connector.
4. Connect the host adapter cable to the drive and the host adapter card.
5. Install the host adapter card in the system unit.
6. Enter the drive type with the system's setup program.
7. Partition and high-level format the disk.

The next few sections describe these activities in detail.

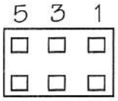
Configuring hard drives for single or multiple drive installation

The IDE drives sold by Gateway 2000 can be used alone, or together with another IDE drive. This section describes how to configure the IDE disk drives currently available from Gateway 2000.

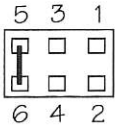
Western Digital Caviar and Piranha drives

To configure a drive for a single drive installation:

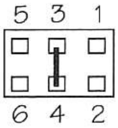
Make sure that no jumper is installed at J8.



Single drive configuration

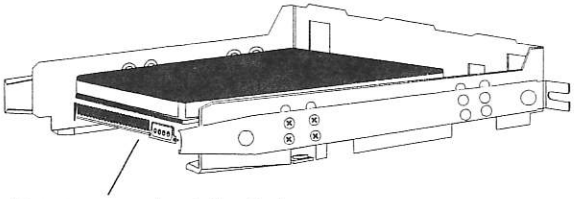


Master drive configuration



Slave drive configuration

J8 jumper settings



J8 is just to the left of the power connector

To configure the drives for a dual drive installation:

1. If you are installing two IDE drives, you must designate one as the primary, or *master* drive, and the other as the secondary or *slave* drive.
2. To configure the drive as a master, install a jumper on pins 5 and 6 of J8.
3. To configure the drive as a slave, install a jumper on pins 3 and 4 of J8.

Note

When a Caviar or Piranha drive is configured as a slave, it delays spin up for four seconds after power is applied to the drive. This feature prevents overloading of the power supply during power up.

Seagate ST1144A drives

A master/slave relationship must be established between drives when two drives are present in the system. Drive 1 is configured as the master and Drive 2 is configured as the slave. The master jumper (marked MTR) and slave present jumper (marked SLV) are used to configure each drive as the master or the slave, as shown in the following table:

Drives	Master jumper	Slave present jumper
Single drive system	Install jumper	Remove jumper
Drive 1 in 2 drive system	Install jumper	Install jumper
Drive 2 in 2 drive system	Remove jumper	Remove jumper

Remote LED

When the pins marked ACT are shorted, the drive indicates activity to the host adapter via the /HOST SLV/ACT line on the AT interface. This line may be connected directly to a 5VDC LED. This line is current-limited to 30 mA.

Other jumpers

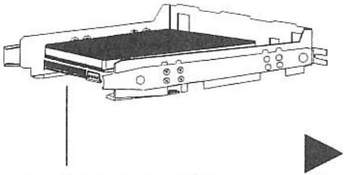
Pins 1 and 2 (marked LT) and 7 and 8 (marked EVS) are reserved for factory use.

Mounting the drive in the system unit

Attach the supplied set of mounting rails to the threaded holes on the sides of the disk drive frame with 6-32 x 0.31 (5/16) screws. Tighten down the screws evenly, and do not overtighten. Make sure that the mounting screws do not contact the drive's circuit board. Then, gently slide the drive into the system unit, and secure with screws.

Once the hard disk is installed in the system unit, connect it to the system power supply and the host adapter card, as described in the next section in this chapter.

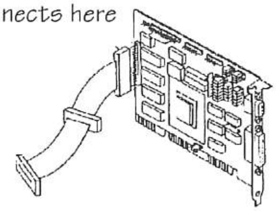
Making the drive connections



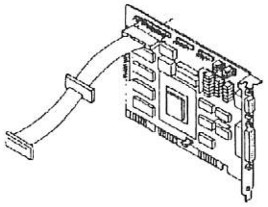
Host interface cable connects here

There are two cables that connect to the hard disk: the host interface cable which connects the hard disk to the host interface card, and the power supply cable.

▶ **To connect the cables to the hard disk and interface card:**



Host interface cable connects here



Floppy disk interface cable connects here

It is important to orient the host interface cable correctly. As you look at the cable, you'll notice a colored stripe on one side. The side of the cable with the stripe goes to the pin one side of the connector on the drive, which is marked with a "1" on the circuit board, and is on the same side as the power supply connector. Some cables are also keyed so that they can only be inserted the correct way.

Connect the other end of the host adapter cable to the host adapter card. Again, align the colored stripe on the cable with pin one on the circuit board.

The power cable that connects the hard disk to the system power supply is keyed, and can only be inserted in the correct way. The power cables are interchangeable; you can use any of them for the hard disk drive.

This is a good time to connect the floppy disk cable. Align the colored stripe on the cable with pin one on the board.

Finally, connect the wires from the front panel hard disk access LED to J1 on the host interface card. Connect the red wire to the post marked "+."

Installing the host adapter card

The host adapter card can be installed in any expansion slot in the system, although it is usually best to install it in the last slot, closest to the power supply.

▶ **To install the host adapter card in the system unit:**

1. Remove any other floppy or hard disk controller card from the system unit.
2. Connect the hard disk and floppy disk drive cables to the card as described in the previous section.
3. Remove the expansion slot cover (if present) for the slot where you are installing the host adapter card.
4. Install the card. Press down on both ends of the card to make sure that it is properly seated. Secure the card to the case with a bracket screw.

Setting the drive type with the system setup program

Note: Please refer to Chapter 2 of this book if you don't know how to access and use the setup program.

After the hard disk and host interface card are physically installed, power up the computer and use its setup program to specify the hard disk drive type you are installing in the system. The *drive type* represents a specific combination of hard disk parameters. Parameters for several drives are shown in Table 6-1.

Table 6-1. IDE hard disk parameters.

Drive	Cyl.	Heads	Pre	LZ	Sectors
Caviar 140	980	5	0	980	17
Caviar 280	980	10	0	980	17
Caviar 2120	872	8	0	872	35
Maxtor LXT200A	816	15	0	816	32
Piranha 4200	987	12	0	987	35
Seagate ST1144A	1001	15	0	1001	17

There should be a selection in the setup program's drive type list that matches the parameters listed in Table 6-1 for your drive. If there isn't, enter the parameters into a user-definable drive type (usually type 49). Exit the setup program when you are finished.

Low-level formatting the hard disk

Some types of hard disk drives (MFM, ESDI, RLL, etc.) require low-level formatting before they can be used. However, IDE drives do not require low-level formatting. You do not need to low-level format your IDE drive. In fact, attempting to do so may render the drive unusable!

Partitioning the hard disk

After you specify the IDE hard disk's drive type in the system setup program, it is ready to be *partitioned* with the FDISK utility. Partitions divide up the hard disk into separate areas which can be used with the same or different operating systems. For example, if you plan to install both MS-DOS and XENIX on the same disk, you create at least two partitions — one for MS-DOS, and one for XENIX.

Even if you run just one operating system (MS-DOS, for example), you still must use FDISK to create a partition.

Complete instructions describing how to partition a hard disk with the FDISK utility are found in Chapter 6 of the *MS-DOS Version 5.0 User's Guide,* starting on page 147. For your convenience, a condensed set of instructions is also included here.

To partition a hard disk with FDISK:

Caution: FDISK destroys all existing files in partitions you modify. If you are using FDISK to alter partitions on a disk that already contains files, be sure to back up any files you want to keep before you begin.

1. Put a disk containing FDISK.EXE in drive A. Type:

```
FDISK <Enter>
```

2. The FDISK main menu appears on the display:

```
              FDisk Options

      Current fixed disk drive: 1

      Choose one of the following:

              1. Create DOS Partition or Logical DOS drive
              2. Set Active Partition
              3. Delete DOS Partition or Logical DOS drive
              4. Display Partition Data
              5. Select Next Fixed Disk Drive

      Enter choice: [1]

      Press ESC to return to DOS
```

- ☐ Choose option 1 to create a DOS partition
- ☐ Choose option 2 to select the active partition if two or more operating systems are installed on the disk in different partitions
- ☐ Choose option 3 to delete a partition from the disk
- ☐ Choose option 4 to display the current partition
- ☐ Option 5 appears only when more than one hard disk is installed in the system unit.

Following the instructions on the screen, create primary and (optional) extended DOS partitions, and assign logical drive designators to the extended DOS partition. After partitioning, the disk is ready to be formatted for DOS as described in the next section of this chapter.

High-level formatting the hard disk and installing DOS

The instructions for this section assume you are installing MS-DOS 5.0, 4.01, 3.3, or more recent. If you are installing XENIX, Novell NetWare, or some other operating system, follow the instructions in the operating system's manuals.

To prepare a hard disk to hold the MS-DOS operating system (sometimes referred to as *high-level* formatting):

1. Boot the system from drive A: with a disk containing the MS-DOS FORMAT.COM file.
2. Type:

   ```
   FORMAT C: /s <Enter>
   ```

   (The "/s" option tells DOS to install two hidden operating system files on the hard disk to make it *bootable.* This allows you to start your computer from the hard disk, without having a floppy disk in drive A.) Answer the questions that appear on the display.
3. To make sure the COMMAND.COM file is correctly copied to your hard disk, type:

   ```
   COPY A:COMMAND.COM C: <Enter>
   ```

4. If you created additional logical drives when you used FDISK, format *each* logical drive. Type:

   ```
   FORMAT D: <Enter>
   ```

   Repeat this step for each logical drive you created. Since only the C: drive needs to be bootable, you don't need to use the "/s" option when formatting logical drive D, E, and so forth.

The disk should now be partitioned and formatted for MS-DOS. If the installation has been completed correctly, you can now boot the system from the hard disk.

To boot the system from the hard disk, remove any disks from drive A and press the reset button on the front of the system unit. After a few moments, the C:> prompt appears on the display.

If the hard disk doesn't boot, refer to the troubleshooting section below.

Solving hard disk problems

If a hard disk fails to boot after you install it, go back and check your work against the instructions in this chapter. Here are some common problem areas:

- ☐ An incorrect drive type number was entered with the system setup program. Remember that the drive type represents a list of parameters for your particular drive; it does not represent the storage capacity in MB! If you discover that you have entered an incorrect drive type, correct the error, and then partition and format the drive again.
- ☐ Drive partitioning with FDISK was not done properly. Make sure that at least one partition has been created, and that the primary DOS partition is activated.
- ☐ Drive formatting with FORMAT program was not done properly. Remember to use the /S option to install DOS on the C: drive. If you have more than one partition, remember to separately format each logical drive you created; C:, D:, E:, and so forth.

☐ Drive is not connected to the system unit power supply.

☐ Cables are connected incorrectly. Make sure that the striped side of the ribbon cable connects to pin one on both the host adapter card and the hard disk. If the cable is plugged into the hard disk drive upside-down, the system "hangs" after performing the memory check.

☐ Drive jumpers are incorrectly set.

☐ Host adapter jumpers or switches are incorrectly set.

☐ Defective hard disk drive cable. Install a new cable.

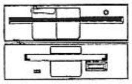
Continuing on

At this point, you have installed just enough of the MS-DOS operating system to allow the system to boot from the hard disk, and load and run applications software. We recommend that you install the entire MS-DOS operating system in a subdirectory, as described in the *MS-DOS User's Guide* included with your system.

If you plan to use Windows (or if your applications software packages require Windows), install it as described in the *Windows User's Guide* supplied with your system.

Floppy Disk Drives

7



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Introduction

Floppy disk drives are rather simple devices, and there isn't a great deal that needs to be said about them. We install three types of floppy disk drives in Gateway 2000 systems:

☐ 3.5-in 1.44MB drives

☐ 5.25-in 1.2MB drives

☐ 5.25-in 360KB drives.

This chapter describes the differences between these drives, and how to format the disks that they use.

3.5-in disks

Figure 7-1 shows a 3.5-in disk drive similar to those installed in Gateway 2000 386/33 computer systems.

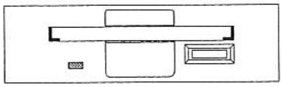


Figure 7-1. 3.5-in floppy disk drive.

▶ To insert a disk in the drive:

1. Orient the disk so that the metal shutter faces the drive, and the arrow printed on the disk is on the top left side of the disk.
2. Slide the disk into the drive until it is inserted all the way and clicks into place.

▶ To remove a disk from the drive:

1. Make certain that the drive is not active (the drive's activity LED should not be lit).
2. Press the disk release button on the front of the drive and remove the disk.

Formatting 3.5-in disks

3.5-in disks are available in two different densities — 1.44MB and 720KB. The 1.44MB drives we install in Gateway 2000 systems can be used with either disk density. However, you use a different formatting command for 720KB disks. To format a 720KB disk in a 1.44MB drive, type:

```
FORMAT b:/t:80/n:9
```

and press Enter.

To format a 1.44MB disk in a 1.44MB drive, type:

```
FORMAT b:
```

and press Enter.

To tell the difference between the two different types of disks, look at the upper left corner of the disk. 1.44MB disks have an extra cutout, as shown in Figure 7-2.

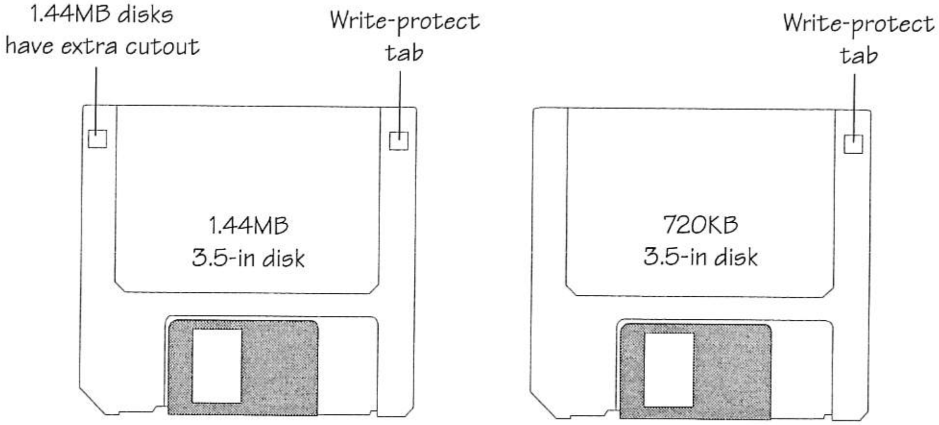


Figure 7-2. Identifying 1.44MB disks.

Many people buy 720KB disks and make the extra cutout themselves. This often works fine, but with some diskettes the number of bad sectors is excessive, and the disks may lose data. For valuable data, we recommend that you use disks certified for 1.44MB operation.

5.25-in disks

Figure 7-3 shows a 5.25-in disk drive similar to those installed in Gateway 2000 386/33 computer systems.

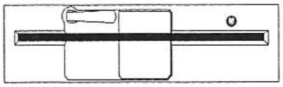


Figure 7-3. 5.25-in floppy disk drive.

▶ To insert a disk in the drive:

1. Orient the disk so that the opening faces the drive, and the write-protect notch is on the left side of the disk.
2. Slide the disk into the drive until it is inserted all the way, and then push the drive lever down.

▶ To remove a disk from the drive:

1. Make certain that the drive is not active (the drive's activity LED should not be lit).
2. Push the drive lever up and remove the disk.

Formatting 5.25-in disks

5.25-in disks are available in two different densities — 1.2MB and 360KB. 1.2MB drives can be used with either disk type, but you use a different formatting command for 360KB disks. To format a 360KB disk in a 1.2MB drive, type:

```
FORMAT A: /4
```

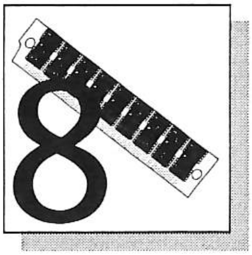
and press Enter.

To format a 1.2MB disk in a 1.2MB drive, type:

```
FORMAT A:
```

and press Enter.

Extended and Expanded Memory



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Introduction

Anyone who works with computers sooner or later arrives at the conclusion that you can never have too much RAM installed in a system. Just when you're certain that you have enough, someone comes out with a new idea that requires just a little bit more than you have (or can afford). The first IBM PC came with 16KB of RAM. Today, just a few years later, Gateway 2000's 386/33 system can hold 64MB!

You might reasonably ask what all that memory is used for. The answer depends on what you want to do.

If you like, you can just keep doing the same things you can do with a regular AT, except faster:

- ☐ Your system's video and system ROM BIOS have slower access times than fast 32-bit RAM. By relocating the contents of the ROM to faster RAM, you can significantly improve system response.

- ☐ Your system's hard disk has a slower access time than RAM. You can use a disk-caching program to copy frequently-needed data to RAM — again, significantly improving system response.

Of course, the best thing about having a lot of memory is that it lets you do things that you can't do without it:

- ☐ Run Terminate and Stay Resident programs (TSRs) from extended or expanded memory to free up more memory for DOS applications.
- ☐ Run applications or use data files that require more than 640KB of RAM.

MS-DOS vs. memory

Now that you've decided that you need at least a couple of megabytes of RAM in your system, we have good news and bad news. The good news is that your 80386-based computer system can hold many, many megabytes of RAM. The bad news is that it takes a little work to use it. You see, the MS-DOS operating system that you run on your 386/33 powerhouse is (unfortunately) exactly the same MS-DOS that the oldest 8-bit 8088-based PC uses. Since the old PC directly addresses only 1MB of RAM, MS-DOS shackles your new 386/33 system with the same limitation.

So even though you can install megabyte upon megabyte of RAM in your system, you cannot access this memory in the same way as the first megabyte of conventional memory in your system. Instead, memory above 1MB is treated as either extended or expanded memory, depending on the needs and capabilities of the software you use.

In this chapter, we discuss the concepts of conventional, extended, and expanded memory, and offer some suggestions on how to use them.

Throughout this chapter, we assume that you are running MS-DOS. OS/2, XENIX, and UNIX approach memory differently, and this information does not apply to them.

Conventional memory

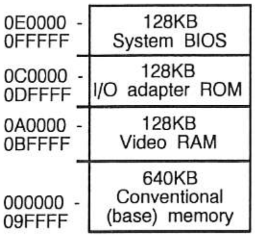


Figure 8-1. Memory map (below 1MB).

The first 640KB of RAM in your system is referred to as *conventional memory*. Most (but not all) of this 640KB is available for applications, depending on what version of DOS you are running and what device drivers are loaded. The rest of the first megabyte (384KB) of address space is referred to as the *upper memory area*. It is reserved for the video and system BIOS, device drivers, and so forth. Allocations for the first megabyte of RAM are shown in Figure 8-1.

Expanded memory

Once you install more than 1MB of RAM in your system, you use it as either expanded or extended memory. Many people are confused by these terms, but you need not be. They simply describe two different approaches to addressing memory above 1MB. Let's look at expanded memory first.

Because MS-DOS can't directly address more than 1MB of RAM, *expanded memory* above 1MB is divided up into small chunks that DOS can digest, called banks. A piece of software called a *memory manager* uses magic and mirrors to swap the banks around at the appropriate moment, without ever using addresses higher than 1MB. MS-DOS thinks that it is still working with just 1MB of RAM, but in reality, it can be dealing with up to 64MB.

Over the last few years, several specifications have appeared that describe how expanded memory systems should work. The latest is LIM 4.0 (sometimes referred to as EEMS 4.0). Your Gateway 2000 386/33 is supplied with a LIM 4.0-compatible memory manager program. Because the program is frequently updated, its instructions are furnished on the program's distribution disk as a README.TXT file.

Generally, you load memory manager software at boot time by including it in either the CONFIG.SYS file or the AUTOEXEC.BAT file.

Extended memory

Extended memory uses the same type of physical memory as expanded memory, but it is accessed in a different way. Instead of swapping banks of memory, extended memory addresses keep on going past the 1MB MS-DOS limitation, up to a theoretical maximum of 4 gigabytes (your 386/33 can physically handle 64MB).

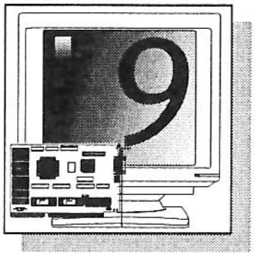
The memory above 1MB is configured as extended memory, but can be used as expanded memory with memory manager software. In fact, it is perfectly possible to set up your system with some expanded memory and some extended memory.

Using extended and expanded memory

If you don't know whether to configure your memory as expanded or extended, the answer is simple — configure it as whatever type of memory your software applications require. Most software packages that require either expanded or extended memory have very specific instructions in their manuals about how to configure memory. Be prepared to spend a couple of days experimenting with configurations and reading manuals and README.TXT files.

If configuring a memory manager makes your eyes cross and your forehead sweat, just use the Windows 3.0 operating environment supplied with your system. It takes care of memory management for most applications painlessly.

Video Display and Display Adapter



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Introduction

Your Gateway system is supplied with a SpeedStar Plus VGA card which is capable of 1024 x 768 resolution with 16 colors, or 800 x 600 resolution with 256 colors.

You can also install additional memory chips available from Gateway 2000 to achieve 1024 x 768 resolution and 256 colors.

The Gateway 2000 VGA card offers the following features:

☐ Register- and BIOS-level compatibility with the IBM VGA adapter

☐ Extended graphics resolution modes providing 640 x 480, 800 x 600, and 1024 x 768 high resolution when used with multi-frequency analog monitors*, and similar maximum resolutions with fixed-frequency analog monitors such as the IBM 85XX series

☐ Extended text modes providing 132 x 25, 132 x 28, 132 x 44, 110 x 40, and 80 x 60 resolutions allowing your microcomputer, using popular emulator and micro/mainframe link products, to display emulation of widely used terminals such as the DEC VT100 and the IBM 3278 MOD 5.

☐ Extended text mode drivers in Lotus 1-2-3, Symphony, WordStar, WordPerfect, and extended graphics mode drivers for AutoDesk AutoCAD, Digital Research GEM, Microsoft Windows and Ventura Publisher

☐ Design and use custom character sets with the font editor and loader software; ideal for scientific and foreign language applications.

* Analog multi-frequency monitors include the Mitsubishi Diamond Scan, NEC MultiSync, Sony Multiscan, and others. The 1024 x 768 mode is supported by the IBM 8514 and compatible monitors and requires at least 512KB video RAM on the Gateway 2000 VGA card.

The layout for the VGA card is shown in Figure 9-1.

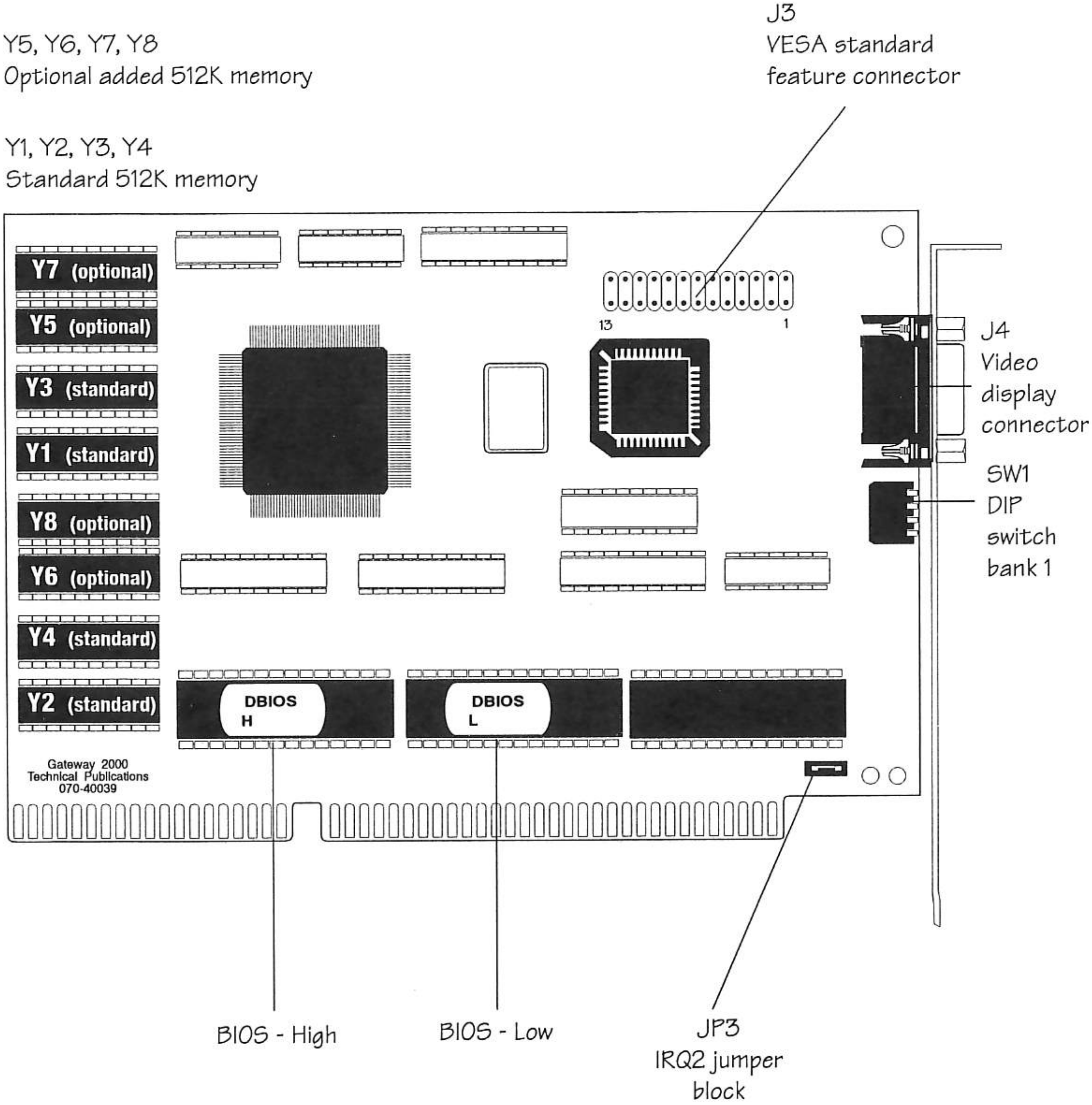


Figure 9-1. Gateway 2000 VGA card layout.

Jumper and switch settings

About disabling IRQ2: The Gateway 2000 VGA display adapter generates a blanking interrupt signal on IRQ2. This signal is required by old game software packages designed for use with CGA and EGA display adapters. Newer software packages designed for use with VGA displays do not require this interrupt.

Many network, MIDI, and sound generator cards use IRQ 2. To avoid conflict, disable IRQ2 on the VGA card by removing JP3 from the VGA card.

IRQ2 is used for EGA register compatibility. Very few applications make use of the IRQ.

The Gateway 2000 VGA card has one jumper block which enables or disables IRQ2. Settings are shown in Table 9-1.

Table 9-1. Jumper settings.

Jumper	JP3 Settings	
JP3 ON (closed)	IRQ2 enabled	(default setting)
JP3 OFF (open)	IRQ2 disabled	

One bank of DIP switches (shown in Table 9-2) are accessible from the rear panel when the card is installed in the system unit.

Table 9-2. VGA card DIP switch SW1 settings.

Switch	Configuration	Setting	Default
1*	Turbo display memory access	ON	Default
	Normal display memory access	OFF	
2*	Turbo display memory access	ON	Default
	Normal display memory access	OFF	
3	16-bit BIOS access	ON	Default
	8-bit BIOS access	OFF	
4	Turbo mode BIOS access	ON	Default
	Normal mode BIOS access	OFF	

* Both switches 1 and 2 activate display memory turbo mode. Settings may vary by machine. Refer to the note on page 9-5 if problems exist when booting the system.

Note:
Switches *toward* the printed number indicate ON.
Switches *away* from the printed number indicate OFF.

Notes:

1) If other hardware in the system uses IRQ2; JP3 should be OFF (open).
2) Systems with a fast I/O bus (over 10 MHz) may require DIP SW4 be set OFF.
3) Some systems may require DIP SW4 be set OFF if installed in an 8-bit slot.
4) If you encounter a problem while booting, set SW1, SW2, and SW4 as follows and test each time until the system boots:

a) SW1 and SW2 ON	SW4 OFF
b) SW2 and SW4 ON	SW1 OFF
c) SW2 ON	SW 1 and SW4 OFF
d) SW1, SW2, and SW4 OFF	

Connectors

The Gateway 2000 VGA card uses a 15-pin (DB15) cable commonly used to interface with analog multi-frequency and dual frequency monitors.

To avoid possible damage to your monitor(s), never connect more than one monitor to the display adapter at the same time. Also, using an incorrect cable may result in damage to the monitor and/or adapter.

When turning on the system, always power up the monitor first. If the monitor is off when you power up the system unit, the card's automatic monitor type sensing circuitry will not work.

Refer to Tables 9-3 and 9-4 on the following page for pinouts on the DB15 and VESA standard connectors.

Table 9-3. Video display connector (DB15-S).

J4	Signal Description	Pin
	Red	1
	Green	2
	Blue	3
	Monitor ID bit 2	4
	Not used	5
	Ground	6
	Ground	7
	Ground	8
	Not used	9
	Ground	10
	Monitor ID bit 0	11
	Monitor ID bit 1	12
	Horizontal Sync	13
	Vertical Sync	14
	Not used	15

Table 9-4. VESA standard feature connector.

J3	Signal Description	Pin
	PB	1
	PG	2
	PR	3
	PI	4
	SB	5
	SG	6
	SR	7
	SI	8
	Dot clock	9
	Blank	10
	HSync	11
	VSync	12
	Ground	13
	Ground	14
	Ground	15
	Ground	16
	Ext video selection	17
	Ext sync selection	18
	Ext dot clock selection	19
	No connection	20
	Ground	21
	Ground	22
	Ground	23
	Ground	24
	No connection	25
	No connection	26

Installing optional memory

Most systems are set up with the normal configuration using the 512KB DRAM built on the VGA card. These 256 x 4 DIPs are soldered in locations Y1, Y2, Y3, and Y4 as shown in Figure 9-1. With this standard memory configuration, the maximum resolution is 1024 x 768 and 16 colors. You may instead choose the option that uses 800 x 600 resolution with 256 colors.

You may wish to install additional memory to achieve the highest resolution and most colors available. The Gateway 2000 VGA card can accommodate up to 1Mb DRAM. Using standard 10-pin 256 x 4 DIPs you may install an additional 512Kb in sockets at locations Y5, Y6, Y7, and Y8. (See Figure 9-1). With 1Mb DRAM on the card, the resolution you can achieve is 1024 x 768 with 256 colors.

Installing the Utilities

▶ To install the utilities to the hard disk drive:

1. Boot the system.
2. Insert the Speedstar VGA Utilities & Drivers diskette into the appropriate floppy drive.
3. Change directory to the drive where the Drivers disk is inserted. For example, if drive A: is the 5.25" 1.2 meg drive, type:

```
A:        <Enter>
```

4. Now install the drivers by using the executable command and the appropriate destination, for example type:

```
INSTALL C:        <Enter>
```

All files are now installed in the directory C:\STAR.

5. Add C:\STAR\UTIL to the path statement in the AUTOEXEC.BAT file, to allow the use of the utilities from the DOS prompt.
6. Remove any diskettes and reboot the system.

Using the VMODE utility program

Use VMODE to select the correct options for the VGA card.

▶ To use the VMODE program:

1. At the C:\ prompt type:

```
cd\STAR\UTIL      <Enter>
```

2. At this subdirectory type:

```
VMODE             <Enter>
```

3. A menu appears with the following options on the command line: MODE, TEXT, MONITOR and HELP. The MODE option permits switching to the various compatibility modes (i.e., monochrome, Hercules, CGA, EGA, VGA). The TEXT option allows switching to the various extended-column modes (135 x 25, 132 x 28, 132 x 44, etc.). The MONITOR option specifies which monitor is connected to the VGA card, so the adapter can adjust timing parameters to display enhanced modes properly.

The following list of monitors may be included in the VMODE.COM program:

- ☐ Fixed frequency monitors
- ☐ IBM 8514
- ☐ NEC 2A

☐ NEC 3D

☐ NEC 4D

☐ NEC 5D

☐ Sony 1302

☐ Sony 1304

☐ Mitsubishi HL6605

☐ Mitsubishi HL6905

☐ MAG 1448

☐ MAG PMV14VC+

☐ Nanao 9500

☐ Nanao 9070u

☐ Nanao 9080i

☐ CS1024

☐ CS1024ni

☐ Custom setting and centering.

You may select *custom* under the MONITOR option of the VMODE.COM menu to create a file containing timing and screen-centering information unique to your monitor. It functions as a memory-resident file. Use the arrow keys to center the screen for each of the following modes included under *custom*.

Note: *Monitor frequency drops to the next lower frequency if you select 256 colors with only 512Kb of video memory installed.

640x480 Mode		
31.5 kHz	60 Hz	Noninterlaced
35.4 kHz	69 Hz	Noninterlaced
37.6 kHz	72 Hz	Noninterlaced

800x600 Mode		
31.5 Khz	48 Hz	Interlaced
35.2 Khz	56 Hz	Noninterlaced
37.9 kHz	60 Hz	Noninterlaced
48.1 kHz*	72 Hz	Noninterlaced

1024x768 Mode

31.5 kHz	39 Hz	Interlaced
35.5 kHz	44 Hz	Interlaced
48 .9 kHz	60 Hz	Noninterlaced
56.5kHz	70 Hz	Noninterlaced

4. When you have selected a monitor type, press <Enter> to exit the menu.
5. At the STAR/UTIL prompt type:

```
cd\                    <Enter>
```

6. Add the VMODE MONITOR command to the AUTOEXEC.BAT file. Insert it on the line below the path statement. Type:

```
C:\STAR\UTIL\VMODE MONITOR        <Enter>
```

   Save the changes made to the AUTOEXEC.BAT file.

7. Reboot your system to load the selected settings.

If no VMODE setting is loaded upon booting, your Gateway 2000 VGA card defaults to standard 80 x 25 VGA text mode and IBM 8514 frequencies.

You can also use the utility without the menu by typing VMODE and a parameter (i.e., VMODE cga). If you do not use the menu, refer now to the following sections *The compatibility modes*, *The extended-column modes*, and *The display modes* for various VMODE parameters.

The compatibility modes

Some programs are written for specific modes or are written according to particular video standards. For example, some programs require a monochrome adapter or are written exclusively for a Color Graphics Adapter. When these kinds of programs are used, it becomes necessary to make your Gateway 2000 VGA card appear as the program requires. When another mode is needed, select the appropriate VMODE parameter. To return to the default VGA mode, type VMODE VGA or power down (the VGA mode is in effect when you power-up the computer). A list of modes and their uses follows. The parameter desired may be set by the VMODE program, directly from the command line (if STAR\UTIL is in the path statement), or by using hexadecimal equivalents of the modes.

Type:

```
        VMODE CGA         <Enter>
```

to set the adapter for compatibility with the color graphics adapter.

Type:

```
        VMODE MDA         <Enter>
```

to set the adapter for compatibility with the monochrome display adapter.

Type:

```
        VMODE HERCULES    <Enter>
```

to set the adapter for compatibility with the Hercules card.

Type:

```
        VMODE EGA         <Enter>
```

to set the adapter for compatibility with the enhanced graphics adapter.

Type:

```
        VMODE VGA         <Enter>
```

to set the adapter for compatibility with the video graphics array.

A typical use might be game software that requires CGA resolution. VMODE CGA puts the Gateway 2000 VGA card in CGA mode. If the software must be rebooted in order to work, type VMODE CGA, and warm-boot (Ctrl+Alt+Del) the computer with the game diskette in drive A: (assuming the game disk is a bootable disk).

The extended-column modes

Note: Not all modes are supported by all monitors. Attempting to use modes which your monitor does not support produces unsatisfactory results.

The Gateway 2000 VGA card provides extended column mode capability with text applications. When this card interfaces with appropriate color displays, it can produce 132 x 44, 132 x 28, 132 x 25, 100 x 40, and 80 x 60 modes in addition to the standard 80 x 25 and 40 x 25 modes. With the appropriate software, the 132-column display capability allows emulation of terminals that require 132 columns of text. With the Gateway 2000 VGA card, you can switch back and forth between the 80-column display modes and the various extended-column display modes.

To switch to a different mode:

Type the mode to use and press <Enter>.

Type:

```
VMODE 132 x 25
```

to switch to 132 x 25 mode.

Type:

```
VMODE 132 x 28
```

to switch to 132 x 28 mode.

Type:

```
VMODE 132 x 44
```

to switch to 132 x 44 mode.

Type:

```
VMODE 40 x 25
```

to switch to 40 x 25 mode.

Type:

```
VMODE 80 x 60
```

to switch to 80 x 60 mode.

Type:

```
VMODE 80 x 25
```

to switch to 80 x 25 mode.

Type:

```
VMODE 100 x 40
```

to switch to 100 x 40 mode.

There are three additional modes that change the scan line resolution. This accommodates some software that specifically looks for a particular number of scan lines. The 400 scan line mode provides the most pleasing text resolution. The three modes are described on the following page

Type:

```
VMODE 200
```

to provide 200 scan lines in 40- or 80 x 25 text modes.

Type:

```
VMODE 350
```

to provide 350 scan lines in 40- or 80 x 25 text modes.

Type:

```
VMODE 400
```

to provide 400 scan lines in 40- or 80 x 25 text modes.

Special VMODE options are available to assist in the use of your Gateway 2000 VGA card. They include:

- ☐ **VMODE TELL** - display current video mode
- ☐ **VMODE VERSION** - display BIOS version
- ☐ **VMODE MONO** - disable color in display modes
- ☐ **VMODE COLOR** - enable color in display modes
- ☐ **VMODE VESA** - enable VESA BIOS extensions.

Table 9-5 shows the VESA BIOS extensions supported by the Gateway 2000 VGA card.

Table 9-5. VESA BIOS extensions.

Graphics Modes	Text Modes
100h: 640x400, 256 colors	108h: 80col x 60 row
101h: 640x480, 256 colors	109h: 132col x 25 row
102h: 800x600, 16 colors	10Ah: 132col x 43row
103h: 800x600, 256 colors	
104h: 1024x768, 16 colors	
105h: 1024x768, 256 colors	

The display modes

The Gateway 2000 VGA card supports the display modes shown in Table 9-6 on the next page.

Table 9-6 Display modes.

Mode	Type	Colors/ Shades	Alpha Format	Buffer Start	Box Size	Max. Page	Display Size
0	A/N	16/256K	40x25	B8000	8x8	8	320x200
0*	A/N	16/256K	40x25	B8000	8x14	8	320x350
0+	A/N	16/256K	40x25	B8000	9xl6	8	360x400
1	A/N	16/256K	40x25	B8000	8x8	8	320x200
1*	A/N	16/256K	40x25	B8000	8x14	8	320x350
l+	A/N	16/256K	40x25	B8000	9x16	8	360x400
2	A/N	16/256K	80x25	B8000	8x8	8	640x200
2*	A/N	16/256K	80x25	B8000	8x14	8	640x350
2+	A/N	16/256K	80x25	B8000	9x16	8	720x400
3	A/N	16/256K	80x25	B8000	8x8	8	640x200
3*	A/N	16/256K	80x25	B8000	8x14	8	640x350
3+	A/N	16/256K	80x25	B8000	9x16	8	720x400
4	APA	4/256K	40x25	B8000	8x8	1	320x200
5	APA	4/256K	40x25	B8000	8x8	1	320x200
6	APA	2/256K	80x25	B8000	8x8	1	640x200
7	A/N	4	80x25	B0000	9x14	8	720x350
7+	A/N	4	80x25	B0000	9x16	8	720x400
D	APA	16/256K	40x25	A0000	8x8	8	320x200
E	APA	16/256K	80x25	A0000	8x8	4	640x200
F	APA	4	80x25	A0000	8x14	2	640x350
10	APA	16/256K	80x25	A0000	8x14	2	640x350
11	APA	2/Z56K	80x30	A0000	8x16	1	640x480
12	APA	16/256K	80x30	A0000	8x16	1	640x480
13	APA	256/256K	40x25	A0000	8x8	1	320x200
22	A/N	16/256K	132x44	B8000	8x8	2	1056x352
23	A/N	161256K	132x25	B8000	8x14	4	1056x350
24	A/N	16/256K	132x28	B8000	8x13	4	1056x364
25	APA	16/256K	80x60	A0000	8x8	1	640x480
26	A/N	16/256K	80x60	B8000	8x8	3	640x480
29	APA	16/256K	l00x37	A0000	8x16	1	800x600
2A	A/N	16/256K	l00x40	B8000	8xlS	4	800x600
2D	APA	256/256K	80x25	A0000	8x14	1	640x350
2E	APA	256/256K	80x30	A0000	8x16	1	640x480
2F	APA	256/Z56K	80x25	A0000	8x16	1	640x400
30	APA	256/256K	l00x37	A0000	8x16	1	800x600
37	APA	16/256K	128x48	A0000	8x16	1	1024x768
38	APA	256/256K	128x48	A0000	8x16	1	1024x768

* Extended Graphics Adapter text modes with 350 scan lines

+ 9x16 character cell enhanced text modes with 400 scan lines

Type: A/N=Alphanumeric (text); APA=All Points Addressable (graphics)

The software diskettes

The Gateway 2000 VGA card is shipped with software utilities to change the hardware default settings, and high resolution drivers to enhance the operation of graphics programs. These utilities are found on the *Utilities & Drivers* and *Windows Drivers* diskettes. These utilities may have also been installed on your system's hard disk before it left Gateway 2000. The following are descriptions of these utilities:

- ☐ **VDIAG.EXE** - a diagnostic program that tests video modes and details the system configuration. Use this test to check/align the display monitor screen and verify all color palettes at various resolutions.
- ☐ **VMODE.COM** - selects the video emulation, text mode, and monitor type. The mode displayed depends on the parameter used. You can access VMODE from the VMODE menu or directly from the command line. This is probably the most important file on the disk and determines the appearance of video for the monitor.
- ☐ **FASTBIOS.SYS** - speeds up video BIOS operations when using 80286- and 80386-based systems. You must install this as the FIRST device in the CONFIG.SYS file.
- ☐ **EANSI.SYS** - replaces the ANSI.SYS device driver on your DOS system disk. EANSI.SYS is compatible with the standard ANSI.SYS, and additionally supports the extended screen modes provided by the Gateway 2000 VGA card.
- ☐ **FEDIT.COM** - the font editor. Use it to create new fonts and/or modify existing fonts. It uses font files (.FNT) which are included in the STAR\UTIL subdirectory.
- ☐ **FLOAD.COM** - the font loader. Use it to load a font into video memory from disk.

The FASTBIOS.SYS device driver

The FASTBIOS.SYS device driver is located in the STAR\UTIL subdirectory. It transfers the contents of the video ROM BIOS to system RAM. This utility enhances video BIOS operation speed considerably. An alternative is using shadow RAM. Install FASTBIOS.SYS by typing the line:

```
DEVICE=C:\STAR\UTIL\FASTBIOS.SYS
```

in the CONFIG.SYS file. It must be the *first* such device driver listed in this file. If this is not done, the following message results upon loading:

```
FASTBIOS NOT INSTALLED
```

Another (earlier installed) device driver has taken over the video interrupt; make sure the line:

```
DEVICE=FASTBIOS.SYS
```

occurs *first* in your CONFIG.SYS file.

When you install FASTBIOS.SYS successfully, the following message appears:

```
FASTBIOS installed
```

Install FASTBIOS.SYS *only* during system boot-up. Remember to re-boot the system after adding FASTBIOS to the CONFIG.SYS file, and make sure FASTBIOS.SYS resides in the same directory as CONFIG.SYS.

Replacing the ANSI.SYS device driver

The command:

```
DEVICE=EANSI.SYS
```

loads EANSI.SYS into memory. Install EANSI.SYS exactly as the ANSI.SYS device driver on the DOS diskette.

EANSI.SYS is compatible with the standard ANSI.SYS, and additionally supports the extended screen modes that the Gateway 2000 VGA card provides. EANSI.SYS is a replacement for ANSI.SYS; *do not* use both at the same time.

Use EANSI.SYS to select the extended screen modes. Accomplish this by issuing an escape sequence with the "set mode" command, just as any standard mode is selected with the normal ANSI.SYS. For example, select mode 22 hex by sending the escape sequence:

```
(Esc) [=34h
```

to the screen. (Note that 34 is the decimal equivalent of 22 hexadecimal.) To select other modes, simply replace 34 with the number of the mode desired. The available extended screen modes using an enhanced color display are shown in Table 9-7.

Table 9-7. Extended screen modes.

Mode	Columns	Rows
34 dec (22 hex)	132	44
35 dec (23 hex)	132	25
36 dec (24 hex)	132	28
42 dec (2A hex)	100	40
38 dec (26 hex)	80	60
02 dec (02 hex)	80	80

For example, to generate 132-column by 44-row mode, place the command:

```
DEVICE=EANSI.SYS
```

in the CONFIG.SYS field on a bootable disk, and place EANSI.SYS and BASICA.COM on that same disk. Boot the system, and type:

```
BASICA           <Enter>
```

Type the following BASIC commands:

```
OPEN"O", 1,"TEMP.DAT"
PRINT#1,CHR$(27);"[=34h";
CLOSE
SYSTEM
```

This creates the file TEMP.DAT containing the escape sequence to select mode 22 hex, 132-column mode. At the DOS prompt, type:

```
TYPE TEMP.DAT             <Enter>
```

This command sends the escape sequence to the screen. The screen is immediately set to 132-column mode. Your machine does not display the escape sequence; it interprets is as a command rather than displayable text.

The custom font loader/editor

Note: Load fonts in text mode *only*. When you select a font to display, immediately every character on the screen is in that new font.

The custom font loader and font editor found in the STAR\UTIL subdirectory, allows instant changes to the character set (character font) on screen. For example the letter "A" can display on screen as @ or !!, or even change to a different character entirely. This is very useful for scientific and foreign language applications, as well as customizing the look of your screen.

The font loader changes the font on display with a single DOS command. You can load one of the several ready-made fonts found in the STAR\UTIL subdirectory, or use the font editor to customize your own fonts. Below are descriptions of the files and their functions.

- ❑ FEDIT.COM - use the font editor to create new fonts and/or modify existing fonts. Start the font editor by typing the command FEDIT at the DOS prompt. Select Help in the main menu for more information.

- FLOAD.COM - use the font loader to load fonts into video memory from disk. You can store up to four fonts in video memory at once, with any *one* of the fonts for display. Type the command FLOAD, with no parameters, for more information on program use.

- FEDIT.HLP - the help file.

The assorted fonts found in the STAR\UTIL subdirectory on your hard disk, are listed below. Any file with the >FNT extension contains a font.

6X8.FNT	a 6 by 8 font for use with the 132-column by 44-line mode.
6X14.FNT	a 6 by 14 font for use with the 132-column by 60-line mode.
8X8.FNT	an 8 by 8 font for use with the 80-column by 60-line mode.
8X8 THIN.FNT	an 8 by 8 font for use with the 80-column by 60-line mode.
8X14.FNT	an 8 by 14 font for use with the 80-column by 25-line mode.
8X14 APL.FNT	an 8 by 14 font, includes APL symbols for use with the 80-column by 25-line mode.
8X14 THIN.FNT	a 8 by 14 font used with the 80-column by 25-line mode.

Software drivers - SpeedCAD DLD (ADI 4.0)

These pages sum up the basics of installing and using SpeedCAD DLD display list driver for AutoCAD release 10, AutoShade, and AutoSketch.

At least 1Mb should be available for the driver. Use expanded (LIM EMS) memory or an EMS emulator program for top performance. Rerun the install program, DLDSETUP, if you change the amount of memory in your system.

▶ To install and configure SpeedCAD DLD:

1. At the C:\ prompt, type:

   ```
   cd\STAR\ADI40     <Enter>
   ```

2. Type:

   ```
   DLDSETUP          <Enter>
   ```

   to start the configuration program. An information screen about what DLDSETUP does appears. Press any key to continue once you have read the overview. Follow the instructions on screen. Help during DLDSETUP is only a keystroke away. At any time you can press the "?" key to get information pertaining to the current DLDSETUP prompt. The DLDSETUP.HLP file must be present in order for help to appear.

3. A prompt requesting the drive for *display list* overflow appears. With SpeedCAD DLD, you have the option to allow the *display list* and the *fast redraw list* to overflow to disk in the event that the display lists run out of RAM storage space. At the prompt, enter the drive letter of the overflow disk. Note that you can run SpeedCAD DLD entirely off of the disk using this feature. You can also have this point to a RAM disk (or VDISK). To disable the overflow, leave this prompt blank.

4. This screen is called the Memory Configuration Menu. It automatically configures the optimum settings for your system. If you are running AutoCAD 386, AutoShade 386 or AutoLisp, answer *yes* to the first question. We recommend setting the extended driver at 1024K.
5. This screen is the Driver Selection Menu. Use the arrow keys to choose either a 16 or 256 color driver.
6. The *single vs dual* screen option tells the driver if you want to operate on only one screen (the one attached to the Gateway 2000 VGA card) or two (in case you also have a monochrome display adapter in the same system as the VGA). If you choose *automatic,* the driver runs single screen when you start AutoCAD on the Gateway 2000 VGA; and dual screen if you start AutoCAD from the monochrome display. Selecting *always dual* causes the driver to always run in dual screen mode - don't select this mode if you do not have a monochrome card in your system.

The next item on this menu is the *interrupt vector* to use for communicating with AutoCAD. The default is 7A (hexidecimal). Don't change this number unless you have a serious need to do so, and if you do change it, make sure to reconfigure AutoCAD to use the new vector number.

The *flip screen method* is a fail-safe feature. In virtually all cases the *instant selection* suffices, but in some rare cases artifacts appear on the display when doing a flip screen back to the graphics display in AutoCAD. If this occurs on your system, use the *force redraw* option to eliminate this artifacting. Please note that this prompt does not appear you select the 256 color VGA driver, since in the 256 color modes you are always running in the *force redraw* mode.

Note: When an object is erased or moved, the *remove* option causes its vectors to be removed from the display list /fast redraw list. The *overwrite* option causes new "erase" vectors to be added to the display list / fast redraw list, so the object is drawn, then rubbed out on screen updates or redraws. This option avoids the potentially major list update delay associated with the *remove* option, but increases redraw time and makes the display list/fast redraw list larger. You can clean up the display list with the DLDCLEAN command. *Disable* disables the display list - and the fast redraw list if you disable it as well.

Now choose the *font size* to use for the menus, pulldowns, and dialog boxes. All the fonts are 8 pixels wide, but the height varies. For resolutions above 800 x 600 we recommend the 8 x 16 font selection. The default is *8 x 14.*

Enter the method for updating the display list. Choose *overwrite* initially.

Enter the method for updating the redraw list. For trouble-free operation, choose *remove.*

Move to the *video card* option and press <F1>, and then <Enter> to select SpeedSTAR VGA.

Choose the appropriate resolution and press F10 to save the configuration information and to get back to the Driver Configuration Menu. Press F10 again to create a batch file called FASTACAD.BAT in the current directory.

7. You are now at the C:\STAR\DLDVGA prompt. Type either Color16 or Color256 to set the color palette. Remember that while you have many more colors to choose from in AutoCAD and AutoSketch in the 256 color mode, drawing is somewhat slower because the driver has to manipulate more bytes of information on the display. Choose S for save and E for exit.
8. Copy the newly created FASTACAD.BAT to your boot drive root directory, your AutoCAD directory, or into any directory on your DOS path. If you want the driver to be installed automatically at startup, edit your AUTOEXEC.BAT file and add a line to run FASTACAD to the end of it. Be sure the directory where FASTACAD.BAT resides is in the path. Restart your system.
9. Switch to the ACAD subdirectory and run FASTACAD.BAT to load the configuration and driver into memory. Start AutoCAD and choose option 5 (configure ACAD). From this menu choose option 3 (configure video display). Select the option for ADI Display v4.0, Interrupt 7A, and all defaults until you return back to the Configure Menu. Choose

Note: If you need to make some change to an existing configuration, running DLDSETUP again allows you to reconfigure SpeedCAD DLD with all the prompts defaulting to the values you had selected during your previous configuration. If you want to start with a completely fresh installation, just delete DLDSETUP.DAT in the directory that the environment variable points to. Also, if at any point during the configuration process you want to change an item on a previous menu, just press the <Esc> key until you return to the correct menu. Pressing the <Esc> at the disk overflow prompt returns you to DOS without making any changes to your configuration.

option 0 to exit to the main menu, and answer Y to save changes.

AutoCAD is now configured and ready to run the high resolution drivers. If you need to change the driver, run steps 1 - 8 again, choosing new values.

What does it do?

SpeedCAD DLD does two things to speed AutoCAD:

☐ It creates and maintains a *display list* - a fast displaying vector list of the current drawing, dramatically increasing performance on pans and zooms

☐ It creates and maintains a *pre-scaled fast redraw list*, allowing redraws to display an average of eight times faster than without the driver.

What is the catch?

SpeedCAD DLD only uses one resource - memory. The driver itself takes up about 45 Kb of RAM from below the DOS 640 Kb limit. The *display list* size can vary from one tenth to three times the size of the current drawing file; the size of the *fast redraw list* varies. We recommend at least 1Mb be set aside for SpeedCAD DLD.

SpeedCAD DLD uses the memory you set aside for it. It abandons the command should the *fast redraw list* run out of memory, until you pan or zoom. Likewise, it abandons the command if the display list also runs out of memory, and the message: DISPLAY LIST OVERFLOW appears. If this occurs frequently, you may need to increase the amount of memory set for the driver and/or add memory to your system to get the full benefit of using SpeedCAD DLD. You can also allow the display list to overflow to disk, which prevents your system from slowing back down to normal AutoCAD speed, but which also does not give you the same performance as running out of memory would.

The display list driver

The SpeedCAD DLD display list driver has only one purpose - to speed up AutoCAD redraws, pans and zooms. The driver is memory-resident and inserts itself between AutoCAD and the VGA board. Installing the driver does not change any of the AutoCAD program files or alter any of the drawing files stored on disk. It has no other effect on AutoCAD's operation besides speeding the program up. It also runs with AutoShade and AutoSketch, but does not affect the speed of these programs, since they do not support display lists. There are two things the driver does to speed operation:

- ☐ AutoCAD usually stores drawings in a hierarchical structure, with simple elements intermixed with complex ones. Every time the screen is updated, AutoCAD decodes this structure. SpeedCAD DLD works differently. While you are working, it translates the normal hierarchical structure into a *display list*, a series of vectors. (The ability to support display lists was specifically added to AutoCAD with Release 10 via the ADI 4.0 interface.) When you pan or zoom, the driver scales the *display list*, then writes the resulting vectors to the VGA hardware. Since the hierarchical structure does not have to be decoded, drawing proceeds very quickly.

- ☐ In addition to the *display list*, SpeedCAD DLD also maintains a fast redraw list. This is an already-scaled version of the *display list* and allows for even faster redrawing. On zooms and pans the fast redraw list clears because they cause a change in the information you are viewing; so it only helps on redraws. Pans and zooms still run much faster than with the standard AutoCAD driver because of the *display list*. AutoCAD users often have a screen full of leftover (blips) from editing operations. The fast redraw list allows for quick removal of these screen artifacts.

How much does SpeedCAD DLD speed things? With the display list, pans and zooms run from two to eight times faster with the new driver. And the fast redraw list further speeds things up to the point that redraws can be up to ten times faster with SpeedCAD DLD, compared to the VGA driver shipped with AutoCAD.

Changing colors

Note: At any time during color configuration, you can press the <Esc> key once or twice and return to the configuration menu. Also, pressing ? provides you with context sensitive help.

With the advent of SpeedCAD DLD, version 2.0, you now receive the *CustomColors* color configuration utility. *CustomColors* gives you the ability to modify all your AutoCAD colors, including menu colors, text colors, dialog box colors, and even drawing colors.

CustomColors simulates an AutoCAD screen, complete with all possible objects. For editing the color configuration when you are running AutoCAD in 16 colors on a Gateway 2000 VGA, use COLOR16.EXE to load *CustomColors*. For the 256 color mode use COLOR256.EXE to load *CustomColors*.

Once you enter the utility, the following configuration menu appears at the bottom of the screen:

Note: In COLOR256, there is no (D)rawing option.

```
(O)bject
(D)rawing
(P)hysical
(A)DI pal
(V)GA pal
(R)eset
(L)oad
(S)ave
(E)xit
```

The menu options perform the following functions.

Object

Selecting this option allows you to change the color of any AutoCAD screen object, such as the graphics area background color, the menu area text color, or the border line color.

Select an object to change by moving the highlight box around with the left and right cursor control keys and pressing <Enter> after highlighting the object you want. A one-line description of the object type displays at the top of the screen as you move the box around.

Select the object, and another highlight box appears around the color boxes near the bottom of the screen. These are the physical colors that the Gateway 2000 VGA card supports. Use the left and right cursor keys (as well as the up and down keys in the 256 color mode) to select which physical color to use for your object and then press <Enter>. The screen quickly redraws with the new color selection for that object. Now you are back at the start of the object selection process in case you want to change the color of another object.

When you change the background color to a new color in COLOR16, all drawing colors identical to that new color swap with the previous background color.

For example, if the current background color is white and you change it to blue, all the boxes in the drawing color area (middle of the screen in 16 color mode) that used to be the same shade of blue are now white. In the 16 color mode, drawing color 0 always reflects the background color.

In COLOR256, changing the background color only causes physical color 0 to assume the same color as the color you select. This does not affect any other colors, unless you chose color 0 for another object, in which case it has the same color as the new background.

Drawing

This option allows you to modify all the AutoCAD drawing colors (color 0 through 255) similar to the way you change object colors.

Note: This option is not available in COLOR256 since you can directly modify all of the 256 physical colors directly, therefore the remainder of this explanation only applies when using COLOR16.

When you select this option, a highlight square appears in the drawing color area of the simulated AutoCAD display. You can manipulate the square using the four cursor keys. You may notice that the drawing color portion of the display is laid out just like the CHROMA drawing in AutoCAD. When you press <Enter>, the highlight moves down to the 16 physical colors, just as it does during the object color selection. Pick the physical color you want to use for the drawing color using the arrow keys and press <Enter> to have your selection take effect.

The highlight box may at times be hard to see, namely because of the background color in effect. *CustomColors* is intentionally designed to work this way, because the highlight box color happens to be the same as the one of the AutoCAD crosshair cursor and the UCS icon. So if you can't see the highlight box during the color configuration, you won't be able to see the cursor when running AutoCAD. If you can't find another background color that "feels right" and still want to use the one that causes problems with the highlight box, you can choose an alternate background color and then modify the associated physical color to suit your needs.

Physical

Choosing the *physical* option from the menu allows you to alter the red, green, and blue components of the physical colors. A highlight box appears in the row of 16 physical colors at the bottom of the screen in COLOR16 or somewhere in the large block of 256 physical colors in COLOR256.

Use the arrow keys to select the color you wish to edit and press <Enter>. Three "sliders" appear near the bottom of the display, with the horizontal position of the slider for each of the color components (red, green, or blue - RGB) indicating the relative intensity of the component. You can use the left and right arrow keys to move the slider for the component you want, or type in a number from 0 to 255. Note that VGAs only support 64 intensities per color component, so an intensity to 0 is the same as an intensity of 3. The up and down arrows allow you to select which component you want to alter. As you manipulate the sliders, all objects on the display that are the same color as the one you select change in hue. This way you can visually determine the most appropriate setting for your display. Pressing <Enter> sets the RGB values you select for the physical color you are modifying.

ADI pal

This constructs a default ADI color palette, as defined in the AutoDesk Device Interface Driver Development Kit.

Note: Selecting ADI pal, VGA pal, Reset, or Load wipes out any current color changes you may have made, unless you save your new settings. Use them only when you really need to, such as when you have made so many color changes that you can't seem to get back to a workable place and want to start over.

VGA pal

This constructs a default VGA color palette when you select the VGA display device during AutoCAD configuration.

Reset

This option resets the physical colors to their initial state. The initial state depends on which of the two palettes (ADI or VGA) you selected prior to choosing this command. If you are selecting this option in a freshly loaded version of COLOR16 or COLOR256, the initial palette is the ADI.

Load

This reloads the color information from the file DLDCOLOR.DAT. It loads from the directory that DLDCFG points to, or from the current directory if DLDCFG is not set. If DLDCOLOR.DAT cannot be found, an error message displays. This command is useful because it allows you to go back to your previously edited color configuration in case you have made some mistakes in setting your colors that you want to undo.

Save

Save the current color palette to DLDCOLOR.DAT. It goes in the directory that DLDCFG points to, or the current directory if DLDCFG is not set.

Exit

Exits *CustomColors*. If you have made some palette changes, but not saved them, it asks if you want to save your changes before exiting.

Advanced features

Among the additional features not accessible through the installation program are a memory meter and the ability to unload or "uninstall" SpeedCAD DLD.

Memory meter

While in AutoCAD, you can check to see how much memory the *display list* and *fast redraw list* are occupying at any time. The way to do this is to type DLDUSAGE at the "command:" prompt. DLDUSAGE returns information about how much EMS and extended memory is still available, and how much memory each viewport is occupying. Since AutoCAD can support up to four viewports, it is possible to have up to four display lists. But multiple viewports don't necessarily have to use multiple display lists, even though each viewport has its own fast redraw list, because of an AutoCAD feature known as *slave viewports*. If a viewport is a slave of another viewport (known as the *master viewport*), then the slave and the master share the same display list, and therefore only the master viewport shows any memory in use for a display list when using DLDUSAGE.

Display list cleanup

While in the *overwrite* mode for display list maintenance, the display lists can be quite large because of multiple ERASEs, MOVEs, ROTATEs, etc. The same may occur, although at a slower pace, in the *remove* mode. Instead of having to do a REGEN to create the display lists from scratch, you can use the DLDCLEAN command to clean up the display lists. The DLDCLEAN command removes all deleted objects from the display lists and requires as much time as an AutoCAD REDRAW to perform its operation. The clean up process erases and recreates the whole display; and in a multiple viewport setting, cleans up all viewports and their associated lists.

Current color/layer indicator

Another feature that simplifies drawing under AutoCAD is the addition of a small, outlined box in the left edge of the status line. Inside the box is the current AutoCAD drawing color. If the status line is disabled, this box does not appear.

On-screen memory meter

The on-screen memory meter reflects how much memory DLD-VGA has had to allocate for its display list. The amount listed may be slightly higher than the amount listed when you use the DLDUSAGE command, because of how memory allocation functions.

Automatic edge panning

Type DLDPANON at the AutoCAD command prompt. If you have the side menu enabled, "EDGEPAN" displays in the lower right corner while edge panning is enabled. To use the automatic edge panning (while it's enabled), just leave the cursor close to an edge of the current viewport for half a second. SpeedCAD automatically starts panning in that direction. Panning stops just prior to causing a REGEN. Do not place the cursor exactly on the edge. The command DLDPANOFF disables automatic edge panning.

Uninstall

Once you are done with running AutoCAD and want to run some other application, it really doesn't make sense to have the driver loaded anymore. Therefore, you may uninstall SpeedCAD DLD. To unload the driver from memory, type DLDVGA-U (or DLDVG256-U) at the STAR\DLDVGA prompt and unless you have loaded some other memory resident programs after loading SpeedCAD DLD, the memory occupied by the driver returns to the pool of free memory used by DOS.

Note: If you change the interrupt vector that SpeedCAD DLD uses to communicate with AutoCAD, you also have to make sure that the DLDCFG environment variable points to the directory containing your DLDSETUP.DAT configuration file. It contains information on which vector SpeedCAD DLD is installed at. (The last line of the FASTACAD.BAT file should list the proper command line options to use when uninstalling the driver.)

Memory usage and lists

SpeedCAD DLD uses two types of memory: *program memory* (also referred to as *conventional memory*), which is the memory in the first megabyte of your PC, normally where DOS resides; and *display list memory*, which can consist of expanded memory, extended memory, and disk space.

With respect to conventional memory, SpeedCAD DLD occupies approximately 45K of conventional memory when used with at least 64K of Expanded (LIM/EMS) memory. If sufficient expanded memory is not available, SpeedCAD DLD has to allocate an additional 32K of conventional memory (for a total of 77K) for its internal use.

Regarding display list memory, it's important to realize that SpeedCAD DLD speeds up AutoCAD operations by creating a *display list* in extended or expanded memory, and sending that list to the VGA for pans and zooms. Redraws are run from the *fast redraw list*, which is even faster. But both of these lists take up memory.

Note: Text takes up a disproportionate amount of space in the *display list*. To keep the list small, put text in its own layer of the drawing. Then don't display the text layer when editing the rest of the figure. This keeps memory consumption down and speeds execution.

How much memory? For production use, we recommend that at least 1Mb be set aside for SpeedCAD DLD. The list for a simple drawing like the shuttle Columbia might only require 20Kb for the *display list*. Complex drawings may require several megabytes. *Display lists* for a drawing may be anywhere from one tenth the size of the drawing file to three times the size; in general, the *display list* averages about the same as the DWG file size. The *fast redraw list* also occupies some memory, with the worst case being that it occupies as much as the *display list*. This means that you should count on both lists generally taking up as much as twice the DWG file size. Also, complex objects such as circles and text "expand" when translated into display list format, so a drawing with a lot of complex objects and text has a larger *display list* than a simpler drawing.

In most cases, the memory you set aside for the display list driver does not affect the underlying performance of AutoCAD significantly. AutoCAD uses paging to support drawings larger than the amount of available memory. Setting AutoCAD memory too low makes the program swap pages more often, which leads to a visible increase in disk activity. This activity generally only occurs during a REGEN, which recreates the display list and causes the drawing file to be accessed directly.

The AutoCAD manuals have an excellent section on performance, concentrating on memory usage. To get the most performance out of the program, read the appropriate sections of those manuals as well as this one.

What happens when the lists grow beyond the amount of memory you set aside? If you have enabled an overflow drive for the *display list*, the list simply expands out to disk. Otherwise, when the driver first runs out of memory, it abandons the *fast redraw list*, slowing redraws to the speed of the fast zooms. But if the *display list* continues to grow until it, too, runs out of memory, it is also abandoned, slowing all screen updates. Drawing speed then reverts to AutoCAD standard speed.

Note: If you are occasionally running out of memory for the *display list*, you are probably running out of memory more often for the *fast redraw list*, slowing performance. If so, buying one or two megabytes of RAM greatly improves your AutoCAD productivity. We recommend that you purchase expanded memory, or extended memory and an EMS emulator program.

Given the different ways people use AutoCAD, the only way to determine the amount of memory you need for SpeedCAD DLD is by trial and error. Once you are using the driver, if it runs out of room for the *display list*, it stops using the list, at which point zooms, pans, and redraws occur at normal AutoCAD speed. The following message appears in the AutoCAD scroll area to notify you that the *display list* has run out of memory:

```
Display List Overflow
```

If you see this message frequently, you need to increase the amount of memory set aside for the driver, disable the *fast redraw list*, and/or enable disk overflow. There is no separate message for the *fast redraw list*, but losing it does not have as drastic an effect on performance as losing the *display list*. Large numbers of ERASEs, MOVEs, and ROTATEs can also increase the display list size, so you may want to occasionally use the DLDCLEAN command to keep your lists fresh, and therefore smaller.

You may want to use the DLDUSAGE command described in the previous section to keep tabs on your display list usage as time goes on.

Also, your system may not have enough memory to manage large drawings without excessive paging and simultaneously support the *display list* and the *fast redraw list*. This may happen because SpeedCAD DLD makes AutoCAD run so much faster that you start to work with larger drawings. After a certain amount of time spent adjusting memory parameters, the only way to do your work at top speed is to buy more memory. We recommend that this be in the form of expanded memory, which runs as much as 20 to 30% faster than extended memory.

Allowing SpeedCAD DLD to use Expanded memory increases your REDRAW, PAN, and ZOOM performance by as much as 40% over using extended memory directly. This is because extended memory can only be accessed in protected mode, and must be copied back and forth, creating a lot of extra operating overhead. Expanded memory on the other hand, can be easily paged in and out, and requires virtually no overhead. Additionally, SpeedCAD DLD only uses 45K of conventional memory when used with expanded memory, instead of the 77K that is required if no expanded memory is available.

If your computer system has extended memory beyond the DOS 640Kb limit, we recommend that you get 386-to-the-Max, Quarterdeck's QEMM, or some other program which allows 386 extended memory to be accessed as expanded memory. If you have a 286 PC, the ALL Chargecard does the same thing. These programs may also allow you to put the 45Kb or so required by the driver itself into high memory, preserving space below the DOS 640Kb line.

It's impossible to predict how performance for your drawings, on your specific hardware setup, are affected by a given set of SpeedCAD DLD configuration parameters. We suggest that if you are running in a low memory situation you run a few tests to help determine the best way to configure AutoCAD with SpeedCAD DLD. Use one of the larger drawing files you regularly work with and bring it up without SpeedCAD DLD, then redraw, pan, and zoom; and time how long each step takes. Then try the same test with varying amounts of memory set aside for AutoCAD and the driver. This gives you solid information to use in determining how best to configure SpeedCAD DLD for use on your system, with your drawings.

The remove/overwrite option

During installation, you are asked if you want to maintain the *display list* and the *fast redraw list* by removing or overwriting erased vectors. (You also have the option of disabling either or both lists, though this option is not needed for normal operations). The **remove** and **overwrite** options come into play when you erase or move an object (moving is the same as erasing and then redrawing somewhere else). When you erase or move an object, the *display list* and *fast redraw list* must be updated to get rid of the "gone" object. There are two ways to do this:

- ☐ **Remove option**—search the list for the offending vectors and remove them. This is the elegant solution, but the search takes a measurable amount of time. For small drawings, the extra time is not noticeable, but for large drawings it is. If you are editing large portions of sizeable (over 100K) drawings, make sure to use the **overwrite** option documented below.
- ☐ **Overwrite option**—add more vectors to the list to overwrite the offending vectors with new vectors in the background color. This avoids the time loss to find and remove the vectors, but causes a strange effect: when the screen is updated, the erased object is drawn, then disappears as it's overwritten by the new vectors in the background color. This slows each redraw, and the extra "overwrite" vectors add to the length of the list. Fortunately, if things get too messy, all you need to do is use the DLDCLEAN command, which cleans up the *display list* in about the time it takes for AutoCAD to perform one of its REDRAWs.

We recommend that you use *remove* mode for both lists for small drawings or if you have a relatively small amount of memory for the lists. For medium-sized drawings, you may want to go to *overwrite* mode for the *fast redraw list*, so that redraws are be speeded, but the *display list* is still updated correctly. This minimizes the strange "draw then undraw" effect for erased objects. For even larger drawings, where searching and updating a list takes a lot of time, go to *overwrite* mode for both lists. Remember to use the DLDCLEAN command occasionally as you erase and move more objects.

Tips & Tricks

VIEWing the Big Picture

Since SpeedCAD DLD is totally transparent to users with respect to using normal AutoCAD commands to REDRAW, PAN, and ZOOM, you still have to suffer from some of AutoCAD's nuances. One of which is that ZOOM ALL and ZOOM EXTENTS both force a REGEN, because AutoCAD does not keep track of various boundries necessary to avoid the REGENs. And REGENs are time consuming and do not use any display list processing to speed themselves up. One way around this problem is to use another of AutoCAD's built-in features, namely the VIEW command.

When you first load your image and see the whole drawing on the screen at once, type VIEW Save ALL, which will save the display position you see under a view named "All". Then, after you've done some detailed editing and want to return back to the big picture, type VIEW Restore ALL, instead of ZOOM All or ZOOM Extents, and the full drawing will be restored to the display at display list speeds, without a REGEN.

Avoiding Accidental REGENs

Another nuance of AutoCAD's is that if you zoom in too far or pan over too far, you may inadvertantly cause a REGEN. AutoCAD again provides a very simple solution: the REGENAUTO command. Just type REGENAUTO Off at the AutoCAD command prompt, and automatic REGENs will be disabled. The REGENAUTO setting is also saved as part of your drawing file, so you only need to execute it once per drawing. You may even want to set REGENAUTO off in your ACAD.DWG drawing template so that all your drawings are created with REGENAUTO set off.

Software drivers - SpeedCAD DLD386 (ADI 4.1)

System Requirements:

- ☐ A 386 or 486 PC with AutoCAD 386, Release 11/386, 3D Studio, or AutoShade 2.0 w/RenderMan.
- ☐ Additional extended memory is recommended for optimal performance.

You may wish to purchase and install additional RAM before installing DLD386-VGA, since it shares memory with AutoCAD Release 11 (or AutoCAD 386). And if AutoCAD is using a lot of memory, SpeedCAD DLD386 may not have enough. If there is significant hard disk activity while you are using DLD386, it may be an indication that you should add more memory to your system.

To install SpeedCAD DLD386-VGA:

1. At the C:\ prompt, type:

```
cd\STAR\ADI41     <Enter>
```

2. Type:

```
DLDSETUP          <Enter>
```

   to start the configuration program. An information screen about what DLDSETUP does appears. Press any key to continue once you have read the overview. Follow the instructions on screen. Help during DLDSETUP is only a keystroke away. At any time you can press the "?" key to get information pertaining to the current prompt. The DLDSETUP.HLP file must be present for help to appear.

3. You are prompted for the type of DLD386 driver you wish to use: 16 Color or 256 Color. The 16 Color driver (DLDVGA.EXP) supports AutoCAD and the AutoShade and 3D Studio design screens in 16

colors at any 16 color resolution (up to 1024 x 768). The 256 Color driver (DLDVG256.EXP) supports AutoCAD in SpeedSTAR's 256 color modes. While you have many more colors to choose from in AutoCAD in the 256 Color mode, drawing is somewhat slower because the driver has to manipulate more bytes of information on the display. In both cases, the rendering portions of 3D Studio and AutoShade 2.0 w/RenderMan are supported at 256 colors (or 32,768 if you have the SpeedSTAR HiColor SVGA).

4. To progress to the next menu, the Driver Configuration Menu, you must press F10 or <Enter>.

5. The *single vs dual* screen option tells the driver if you want to operate on only one screen (the one attached to the Gateway 2000 VGA card) or two (in case you also have a monochrome display adapter in the same system as the VGA). If you choose *automatic*, the driver runs single screen when you start AutoCAD on the Gateway 2000 VGA; and dual screen if you start AutoCAD from the monochrome display. Selecting *always dual* causes the driver to always run in dual screen mode - don't select this mode if you don't have a monochrome board in your system.

   The *flip screen method* is a fail-safe feature. In virtually all cases the *instant selection* suffices, but in some rare cases the combination of a certain VGA with a system may result in artifacts on the display when doing a flip screen back to the graphics display in AutoCAD. If this occurs on your system, use the *force redraw* option to eliminate this artifacting. The forced redraw occurs at normal AutoCAD speed, not DLD386 redraw speed. Please note that this prompt does not appear when you have selected the 256 Color VGA driver, since in the 256 color modes you are always running in the *force redraw* mode.

   Now choose the *font size* to use for the menus, pulldowns, and dialog boxes. All the fonts are 8 pixels

Note: When an object is erased or moved, the *remove* option causes its vectors to be removed from the display list /fast redraw list. The *overwrite* option causes new "erase" vectors to be added to the display list / fast redraw list, so the object is drawn, then rubbed out on screen updates or redraws. This option avoids the potentially major list update delay associated with the *remove* option, but increases redraw time and makes the display list/fast redraw list larger. You can clean up the display list with the DLDCLEAN command. *Disable* disables the display list - and the fast redraw list if you disable it as well.

Note: If you need to make some change to an existing configuration, running DLDSETUP again allows you to reconfigure SpeedCAD DLD with all the prompts defaulting to the values you had selected during your previous configuration. If you want to start with a completely fresh installation, just delete DLDSETUP.DAT in the directory that the environment variable points to. Also, if at any point during the configuration process you want to change an item on a previous menu, just press the <Esc> key until you return to the correct menu. Pressing the <Esc> at the disk overflow prompt returns you to DOS without making any changes to your configuration.

wide, but the height varies. For resolutions above 800 x 600 we recommend the 8 x 16 font selection. The default is 8 x 14.

Enter the method for updating the display list. Choose *overwrite* initially.

Enter the method for updating the fast redraw list. For trouble-free operation, choose *overwrite*.

Indicate whether or not you are using the SpeedSTAR HiColor SVGA. If you don't think you have one on your board, then you probably don't. VGA boards equipped with the HiColor DAC can display up to 32,768 colors when used with 3D Studio or AutoShade 2.0 w/RenderMan. Only answer Yes to this question if you know for sure that you have a SpeedSTAR HiColor and you are going to be using an Autodesk rendering package.

Enter the number of lines of text to appear at the bottom of your AutoCAD screen. You may select a number anywhere between 1 and 10. If you do not want any lines of text at the bottom of the display, use AutoCAD to disable the command area (see your AutoCAD Installation manual for more information). The default for this prompt is 3.

Move to the video card option and press <F1> and then <Enter> the single choice, SpeedSTAR VGA.

Choose the appropriate resolution and press <F10> to save the configuration information and to get back to the Drive Configuration Menu. Press <F10> again to create a batch file called FASTACAD.BAT in the current directory.

6. You are now at the C:\STAR\DLDVGA prompt. Type either COLOR16 or COLOR256 to set the color palette. Remember that while you have many more colors to choose from in AutoCAD and AutoSketch in the 256 color mode, drawing is somewhat slower

because the driver has to manipulate more bytes of information on the display. Choose S for save and E for exit.

Note: DLD386 is NOT installed as a TSR, instead, AutoCAD uses the DSPADI environment variable to determine where the display driver can be found and what the driver's name is. AutoShade and 3D Studio both require the RCPADI and RDPADI environment variables to be set.

7. Copy the newly created FASTACAD.BAT to your boot drive root directory, your AutoCAD directory, or into any directory on your DOS path. Then, whenever you want to load DLD386, just run the FASTACAD.BAT file. The FASTACAD.BAT file contains four lines that set four separate environment variables: DLDCFG - used by PanaRender-VGA+ to find all of its configuration files; and DSPADI, RCPADI, RDPADI - used by AutoCAD, AutoShade 2.0 w/RenderMan, and 3D Studio to find the driver file. FASTACAD.BAT only needs to be run once per system boot.

   The actual configuration information for DLD386 is located in the file DLDSETUP.DAT, which was created or modified when you last ran DLDSETUP.

8. If you want the environment variables to be set automatically at startup, edit your AUTOEXEC.BAT file and add a line to run FASTACAD to the end of it. Be sure the directory in which FASTACAD.BAT resides is in your PATH. Restart your system.

Note: If you get a message such as:

Out of Environment Space

when you run FASTACAD.BAT, you need to enlarge your environment. If you are running MS-DOS 3.2 or later, this is done by adding SHELL=COMMAND.COM /P C:\/E:768 to your CONFIG.SYS file. The /E:768 specifies an environment size of 768 bytes. Change this number as appropriate. You need to reboot if you modify your CONFIG.SYS file.

9. Switch to the ACAD subdirectory and run FASTACAD.BAT to load the configuration and driver into memory. Start AutoCAD and from the main menu choose option 5 (configure ACAD). Then choose option 3 (configure video display). Select ADI P386 dislay driver option as the display device. For more details, please refer to the AutoCAD "Installation and Performance Guide".

10. You are now ready to use the accelerated AutoCAD. If you are not sure that AutoCAD is using DLD386, type DLDUSAGE at the AutoCAD command prompt while editing a drawing. If DLD386 is loaded and running, this command should return information about memory usage. If AutoCAD reports an error instead, your DLD386 is not properly loaded.

What does it do?

DLD386-VGA does two things to speed AutoCAD:

- ☐ It creates and maintains a *display list* - a fast-displaying vector list of the current drawing - dramatically increasing performance on pans and zooms .
- ☐ It creates and maintains a pre-scaled *fast redraw list*, allowing redraws to display an average of eight times faster than without the driver.

What is the Catch?

The only resource used by DLD386 is memory. The driver itself takes up about 35 Kbytes of RAM from extended memory, which means it does not affect normal DOS operation. The driver is loaded by AutoCAD at AutoCAD load time.

The *display list* size can vary from one tenth to three times the size of the current drawing file; the size of the *fast redraw list* varies.

Since DLD386 shares extended memory with AutoCAD, no separate memory configuration options are required. But, if you notice AutoCAD accessing the disk a lot during PANs, ZOOMs, and REDRAWs while using DLD386, it means that DLD386 has begun paging to disk, and is therefore not operating at optimum performance. If this occurs frequently, you may want to use the DLDCLEAN command more often and/or you may need to add memory to your system to get the full benefit of using SpeedCAD DLD386.

More about SpeedCAD DLD386

SpeedCAD DLD386 has only one purpose: to speed up AutoCAD REDRAWs, PANs, and ZOOMs. The driver is loaded into memory by AutoCAD and inserts itself between AutoCAD and the Gateway 2000 VGA card. It has no other effect on AutoCAD's operation besides speeding the program up. Installing the driver does not change any of the AutoCAD program files or alter any of the drawing files stored on disk. There is no change to the user's interface with AutoCAD.

How does DLD386 make AutoCAD run faster?

There are two things the driver does to speed operation:

- ☐ AutoCAD stores drawings in a hierarchical structure, with simple elements intermixed with complex ones. Every time the screen is updated, AutoCAD decodes this structure. DLD386 works differently. While you are working, it translates the normal hierarchical structure into a Display List, a series of vectors. (The ability to support display lists was specifically added to AutoCAD with Release 10 via the ADI 4.0 interface.) When you pan or zoom, the driver scales the display list, then writes the resulting vectors to the VGA hardware. Since the hierarchical structure does not have to be decoded, drawing proceeds very quickly.
- ☐ In addition to the display list, DLD386 also maintains a fast redraw list. This is an already-scaled version of the display list and allows for even faster redrawing. On pans and zooms the fast redraw list clears because they cause a change in what information is being viewed, so it only helps on redraws. (Pans and zooms still run much faster than with the standard AutoCAD driver because of the display list.) AutoCAD users often have a screen cluttered with leftover pieces (blips) from editing operations. The fast redraw list allows for quick removal of these screen artifacts.

How much does DLD386 speed things? With the display list, pans and zooms run from two to eight times faster with the new driver. And the fast redraw list further speeds things up to the point that redraws can be up to ten times faster with DLD386, compared to the VGA driver shipped with AutoCAD.

Changing Colors

With the advent of DLD386, you now receive the *CustomColors* color configuration utility. *CustomColors* gives you the ability to modify all your AutoCAD colors, including menu colors, text colors, dialog box colors, and even drawing colors.

CustomColors simulates an AutoCAD screen, complete with all possible objects. For editing the color configuration when you are running AutoCAD in 16 colors on a VGA, use COLOR16.EXE to load CustomColors, and for the 256 color VGA modes use COLOR256.EXE. Once you enter the utility, you are provided with the following configuration menu at the bottom of the screen:

```
(O)bject
(D)rawing
(P)hysical
(A)DI pal
(V)GA pal
(R)eset
(L)oad
(S)ave
(E)xit
```

Note: In COLOR256, there is no (D)rawing option.

The menu items perform the following functions.

Object

Selecting this option allows you to change the color of any AutoCAD screen object, such as the graphics area background color, the menu area text color, or the border line color.

Select an object to change by moving the highlight box around with the left and right cursor control keys and pressing <Enter> after highlighting the object you want. A one line description of the object type displays at the top of the screen as you move the box around.

Select the object, and another highlight box appears around the color boxes near the bottom of the screen. These are the physical colors that the Gateway 2000 VGA card supports. Use the left and right cursor keys (as well as the up and down keys in the 256 color mode) to select which physical color should be used for the object you have selected and press <Enter>. The screen quickly redraw with the new color selection for that object. Now you are back at the start of object selection in case you want to change the color of another object.

When you change the background color to a new color in COLOR16, all drawing colors identical to that new color swap with the previous background color. For example, if your current background color is white and you change it to blue, all the boxes in the drawing color area (middle of the screen in 16 color mode) that used to be the same shade of blue are now white. In the 16 color mode, drawing color 0 always reflects the background color.

In COLOR256, changing the background color only causes physical color 0 to assume the same color as the color you have selected. This does not affect any other colors, unless you have chosen color 0 for another object, in which case it has the same color as the new background.

Drawing

This option allows you to modify all the AutoCAD drawing colors (color 0 through 255) in a fashion similar to the way you change object colors.

Note: This option is not available in COLOR256 since you can directly modify all of the 256 physical colors directly, therefore the remainder of this explanation only applies when using COLOR16.

When you select this option, a highlight square appears in the drawing color area of the simulated AutoCAD display. The square can be manipulated using the four cursor keys. You may notice that the drawing color portion of the display is laid out just like the CHROMA drawing supplied with AutoCAD. When you press <Enter>, the highlight moves down to the 16 physical colors, just as it does during the object color selection. Pick the physical color you want used for the selected drawing color using the arrow keys and then press <Enter> to have your selection take effect.

The highlight box may at times be hard to see, namely because of the background color in effect. *CustomColors* is intentionally designed to work this way, because the highlight box color happens to be the same as the one used by the AutoCAD crosshair cursor and the AutoCAD UCS icon. So if you can't see the highlight box during the color configuration, then you won't be able to see the cursor when running AutoCAD. So if you can't find another background color that "feels" right and still want to use the one that was causing you problems with the highlight box, you can choose an alternate background color and then modify the associated physical color to suit your needs.

Physical

Choosing the *physical* option from the menu allows you to alter the red, green, and blue components of the physical colors. A highlight box appears in the row of 16 physical colors at the bottom of the screen in COLOR16 or somewhere in the large block of 256 physical colors in COLOR256.

Use the arrow keys to select the color you wish to edit and press <Enter>. Three "sliders" appear near the bottom of the display, with the horizontal position of the slider for each of the color components (red, green, or blue - RGB) indicating the relative intensity of the component. You can use the left and right arrow keys to move the slider for the selected component, or type in a number from 0 to 255. Note that VGAs only support 64 intensities per color component, so an intensity of 0 is the same as an intensity of 3. The up and down arrows allow you to select which component you want to alter. As you manipulate the sliders, all objects on the display that are of the same color as the selected physical color change in hue. This way you can visually determine the most appropriate setting for your display. Pressing <Enter> sets the RGB values you have selected for the physical color you are modifying.

ADI pal

This constructs a default ADI color palette, as defined in the Autodesk Device Interface Driver Development Kit.

Note: Selecting ADI pal, VGA pal, Reset, or Load wipes out any current color changes you may have made, unless you save your new settings. Use them only when you really need to, such as when you have made so many color changes that you can't seem to get back to a workable place and want to start over.

VGA pal

This constructs a default VGA color palette when you select the VGA display device during AutoCAD configuration.

Reset

This option resets the physical colors to their initial state. The initial state depends on which of the two palettes (ADI or VGA) you selected prior to choosing this command. If you are selecting this option in a freshly loaded version of COLOR 16 or COLOR256, the initial palette is the ADI.

Load

This reloads the color information from the file DLDCOLOR.DAT. It loads from the directory that DLDCFG points to, or from the current directory if DLDCFG is not set. If DLDCOLOR.DAT cannot be found, an error message displays. This command is useful because it allows you to go back to your previously edited color configuration in case you have made some mistakes in setting your colors that you want to undo.

Save

Save the current color palette to DLDCOLOR.DAT. It is saved to the directory pointed to by DLDCFG, or to the current directory if DLDCFG is not set.

Exit

Exits *CustomColors*. If you have made palette changes, but not saved them, it asks if you want to save your changes before exiting.

Advanced Features

Among the additional features not accessible through the installation program are a memory meter, a command to manually clean up the display lists, and a current color indicator.

Memory Meter

While in AutoCAD, you can check to see how much memory the display list and fast-redraw list are occupying at any time. Do this by typing DLDUSAGE at the "command:" prompt. DLDUSAGE returns information about how much memory each viewport is occupying. Since AutoCAD can support up to sixteen viewports, it is possible to have up to sixteen display lists. But multiple viewports don't necessarily have to use multiple display lists, even though each viewport has its own fast-redraw list, because of an AutoCAD feature known as *slave viewports*. If a viewport is a slave of another viewport (known as the *master viewport*), then the slave and the master share the same display list, and therefore only the master viewport shows any memory in use for a display list when using DLDUSAGE.

Display List Cleanup

While in the *overwrite* mode for display list maintenance, the display lists can get quite large because of multiple ERASEs, MOVEs, ROTATEs, etc. (see - The Remove/Overwrite Option). The same may occur, although at a slower pace, in the *remove* mode. Instead of having to do a REGEN to recreate the display lists from scratch, you can use the DLDCLEAN command to clean up the display lists. The DLDCLEAN command removes all deleted objects from the display lists and requires as much time as an AutoCAD REDRAW to perform its operation. The clean up process erases and recreates the whole display; and in a multiple viewport setting, cleans up all viewports and their associated lists.

Current Color/Layer Indicator

Another feature that simplifies drawing under AutoCAD is the addition of a small, outlined box on the left edge of the status line. Inside the box is the current AutoCAD drawing color. If the status line is disabled, this box does not appear.

Additional Commands

As of this version, DLD386 supports a number of new AutoCAD command line commands designed to allow advanced user better control over display list processing:

DLDHELP - provides a one-line summary for every special DLD386-VGA command. It's recommended that you flip to the text screen to view the output.

DLDVER - displays the DLD386-VGA version and serial number.

DLDDLMODE - displays the current mode of the redraw and display list (i.e. *remove, over write, or disabled*).

All of the following force a DLDCLEAN to be processed when executed:

DLDFREEMEM - frees up all display list memory currently in use by DLD386, and performs a DLDCLEAN. This is useful when DLD386 has gone a long time without a DLDCLEAN and has allocated more memory than is necessary. You may want to use this command instead of DLDCLEAN .

DLDDLISTRM - puts the display list in *remove* mode.

DLDDLISTOV - puts the display list in *overwrite* mode.

DLDDLISTDS - disables the display list.

DLDFLISTRM - puts the fast redraw list in *remove* mode.

DLDFLISTOV - puts the fast redraw list in *overwrite* mode.

DLDFLISTDS - disables the fast redraw list.

Memory Usage and Lists

Note: Text takes up a disproportionate amount of space in the *display list.* To keep the list small, put text in its own layer of the drawing. Then don't display the text layer when editing the rest of the figure. This keeps memory consumption down and speeds execution.

SpeedCAD DLD386 shares extended memory with AutoCAD via the PharLap Virtual Memory Manager. This means that DLD386 automatically pages to disk if it uses up all the RAM that AutoCAD has left for its use. See Appendix A.3 in the AutoCAD Installation and Performance Guide for more information on Virtual Memory Management. Please note that if you start seeing excessive hard disk accesses during PANs, REDRAWs, and ZOOMs while using AutoCAD with DLD386, try using the DLDCLEAN command more often. If this doesn't affect the amount of disk access it's probably time to add more memory to your system.

Regarding display list memory, it's important to realize that DLD386 speeds up AutoCAD operations by creating a *display list* in memory, and sending that list to the VGA for pans and zooms. Redraws are run from the fast redraw list, which is even faster. But both of these lists take up memory.

How much memory? For production use, we recommend that at least 1 megabyte be available for DLD386. To determine how much memory AutoCAD is using, use the status command while in AutoCAD (refer to Section 4.4.1, page 37, in the AutoCAD Installation and Performance guide for more information).

The display list for a simple drawing like the shuttle Columbia might only require 20 Kbytes for the display list. Complex drawings may require several megabytes. Display lists for a drawing may range from one-tenth the size of the drawing file to three times the size; in general, the display list averages about the same as the DWG file size. The fast redraw list also occupies some memory, with the worst case being that it occupies as much as the display list. This means that you should count on both lists generally taking up as much as twice the DWG file size. Also, complex objects such as circles and text "expand" when translated into display list format, so a drawing with a lot of complex objects and text has a larger display list than a simpler drawing.

The AutoCAD manuals have an excellent section on performance, concentrating on memory usage. To get the most performance out of the program, read the appropriate sections of those manuals as well as this one.

Note: If you find that your DLD386 REDRAWs, PANs, and ZOOMs are causing excessive hard disk accesses (due to paging or swapping), you are probably running out of RAM space. At this point you have three options:
1) Start using the DLDCLEAN command more frequently
2) Disable the Fast Redraw List, which slows down your redraws and give you a little more RAM to play with
3) Buy at least one or two more megabytes of 32-bit RAM. This greatly improves your productivity under AutoCAD.

You may want to use the DLDUSAGE command described in the previous section to keep tabs on your display list usage as time goes on.

Also, your system may not have enough memory to manage large drawings without excessive paging and simultaneously support the display list and the fast redraw list. This may happen because DLD386 makes AutoCAD run so much faster that you start to work with larger drawings! After a certain amount of time spent adjusting memory parameters, the only way to do your work at top speed is to buy more memory.

The Remove/Overwrite Option

During installation, you are asked if you wish to maintain the display list and the fast redraw list by removing or overwriting erased vectors. (You also have the option of disabling either or both lists, though this option is not needed for normal operations). The *remove* and *overwrite* options come into play when you erase or move an object (moving is the same as erasing and then redrawing somewhere else). When you erase or move or rotate an object, the display list and fast redraw list must be updated to get rid of the "displaced" object. There are two ways to do this:

- ☐ **Remove option** - searches the list for the offending vectors and remove them. This is the elegant solution, but the search takes a measurable amount of time. For small drawings, the extra time is not noticeable, but for large drawings it is. If you are editing large portions of sizeable (over 100K) drawings, make sure to use the *overwrite* option documented below.
- ☐ **Overwrite option** - adds more vectors to the list to overwrite the offending vectors with new vectors in the background color. This avoids the time loss to find and remove the vectors, but causes a strange effect: when the screen is updated, the erased object is drawn, then disappears as it's overwritten by the new vectors in the background color. This slows each redraw, and the extra "overwrite" vectors add to the length of the list. Fortunately, if things get too messy, all you need to do is use the DLDCLEAN command to clean up the display list in about the time it takes for AutoCAD to perform one of its REDRAWs.

We recommend that you use *remove* mode for both lists for small drawings or if you have a relatively small amount of memory for the lists. For medium-sized drawings, you may want to go to *overwrite* mode for at least the fast redraw list, so that redraws are speeded, but the display list is still updated correctly. This minimizes the strange "draw then undraw" effect for erased objects. For even larger drawings, where searching and updating a list takes a lot of time, go to *overwrite* mode for both lists. Remember to use the DLDCLEAN command occasionally as you erase and move more objects.

As of this version of DLD386, you can change the display and fast redraw list modes on the fly using the commands listed in the Additional Commands section.

Tips & Tricks

Since DLD386 is totally transparent to users with respect to using normal AutoCAD commands to REDRAW, PAN, and ZOOM, you still have to suffer from some of AutoCAD's nuances. One of these nuances is that ZOOM ALL and ZOOM EXTENTS both force a REGEN, because AutoCAD does not keep track of various boundaries necessary to avoid the REGENs. And REGENs are rather time-consuming and don't use any display list processing to speed themselves up. One way around this problem is to use another of AutoCAD's built-in features, namely the VIEW command.

When you first load your image and see the whole drawing on the screen at once, just type VIEW Save ALL, which saves the display position you see under a view named "All". Then, after you've done some detailed editing and want to return back to the big picture, type VIEW Restore ALL, instead of ZOOM All or ZOOM Extents, and the full drawing is restored to the display at display list speeds, without a REGEN.

Avoiding Accidental REGENs

Another nuance of AutoCAD's is that if you zoom in too far or pan over too far, you may inadvertently cause a

REGEN. AutoCAD again provides a very simple solution: the REGENAUTO command. Just type REGENAUTO Off at the AutoCAD command prompt, and automatic REGENs is disabled. The REGANAUTO setting is also saved as part of your drawing file, so you only need to execute it once per drawing. You may even want to set REGENAUTO off in your ACAD.DWG drawing template so that all your drawings are created with REGENAUTO set off.

Adding DLDCLEAN to your Pull-Downs

If you find that you are frequently using the DLDCLEAN command, you may want to add it to your pull-down menus. We recommend adding it to the Display menu. This can be done by editing the file ACAD.MNU, which contains the commands for all your pull-downs, as well as the side menus. Make sure to make a backup copy of ACAD.MNU first! Search the file for the Display menu definition (usually found after a line that says ***POP4). Go to the end of the definition, just past the line that starts off with [Set Viewports...], and add the following two lines:

```
[~--]
[Clean Display List]^C^CDLDCLEAN
```

Once these two lines have been added, save the edited ACAD.MNU file and run AutoCAD. Pull up a drawing that uses the standard AutoCAD menus, and AutoCAD recompiles the ACAD.MNU file into ACAD.MNX. Once this compilation is complete, you should be able to use the Clean Display List pick off of the Display menu to clean up DLD386-VGA's display lists for all your normal drawings.

Using 3D Studio and AutoShade 2.0 w/RenderMan

AutoShade 2.0 with RenderMan

To configure AutoShade v2.0 to use DLD386, start

AutoShade with SHADE / R, which allows you to reconfigure AutoShade. For the display device, select P386 Autodesk Device Interface display driver, and for the rendering display select the P386 Autodesk Device Interface rendering driver. If you are running the display and rendering screen on the same monitor (i.e. single monitor), make sure to tell AutoShade this. A single monitor approach requires a redraw of the display screen after a rendering screen.

Autodesk 3D Studio

To configure 3D Studio, you need to edit the 3DS.SET file, located in your 3DS directory. Locate the line that starts with DEFAULT-DISPLAY. You want to modify it so that the line reads:

```
DEFAULT-DISPLAY=RCPADI.
```

Do the same with the line that starts with MAIN-DISPLAY (i.e. MAIN-DISPLAY=RCPADI). Make sure to remove the ";" in front of these lines. Also, if you selected to use the 256 color VGA driver during the set up, you may change the MATERIALS-DISPLAY line in 3DS.SET as well. Save your changes, and you're ready to use 3D Studio. See your 3D Studio installation documentation for additional information on configuring 3D Studio.

Software drivers - Microsoft Windows 3.0

The SpeedSTAR VGA *Windows Drivers* diskette contains drivers that support 640 x 480, 800 x 600 and 1024 x 768 resolutions with 16 or 256 colors. To use 800 x 600 and 1024 x 768 modes, you need an analog color display capable of these high resolutions. 256 color modes at 800 x 600 and 1024 x 768 resolutions require 1Mb of video memory on the VGA card.

To install the drivers:

Note: If you simply wish to change the resolution and/or color choices, click on the Windows Setup icon found in the Main Group and proceed with steps 4 through 7. You do not need to insert any disks for this operation.

1. Change to the STAR\WINDOWS directory. Type:

```
cd STAR\WINDOWS          <Enter>
```

2. Copy all files to the WINDOWS/SYSTEM subdirectory on your hard disk. To do this, type at the C:\STAR\WINDOWS prompt:

```
COPY *.* C:\WINDOWS\SYSTEM       <Enter>
```

3. Change to the Windows directory by typing:

```
cd\WINDOWS       <Enter>
```

from the C:\Windows prompt type:

```
setup            <Enter>
```

4. An option menu appears. Press the up arrow to highlight the Display line. Press <Enter>. Select the resolution and color choice desired and press <Enter> to accept the choices.

4. The option menu appears again. Highlight *accept configuration shown above* and press <Enter>.

5. When setup is complete, the c:\windows prompt appears.

6. Start Windows normally. After you complete the above steps you can begin using Windows 3.0 in the higher resolutions.

Software drivers - GEM version 2.2

Note: Be sure the VGA monitor can display 800 x 600 and/or 1024 x 768-pixel resolution. Choosing a higher resolution than the monitor is capable of displaying brings about unsatisfactory results.

The following instructions are applicable to users of GEM Version 2.2.

The GEM driver files require a new GEMSETUP.TXT file to be installed in place of the one on the GEM Device Driver Diskette #1. The drivers make full use of the extended graphics modes of the Gateway 2000 VGA graphics adapter. The VGA monitor must be capable of displaying these resolutions in order to utilize this driver.

▶ To install GEM:

1. Make a DISKCOPY of GEM Device Driver Disk #1. Use this copy in place of the original during installation.

   Example:

   ```
   DISKCOPY A: B: or
   DISKCOPY A: A:
   ```

2. Delete unnecessary screen drivers from the newly diskcopied diskette. Copy the file GEMSETUP.V22 and the screen drivers from the STAR\GEM subdirectory to the newly diskcopied diskette.

   Example:

   ```
   DEL B: SD*.*

   COPY C:\STAR\GEM\GEMSETUP.V22 B:GEMSETUP.TXT

   COPY C:\STAR\GEM\SD*.SYS B:
   ```

   Now refer to GEM's manual to proceed with the normal installation.

The program prompts you to insert GEM's Device Driver Disk #1. Insert, instead, the newly diskcopied diskette and the installation continues. Complete the installation as instructed, selecting:

```
K. SpeedSTAR VGA Adapter
(800x600) 16Color   Mode;VGA 800, or

L. SpeedSTAR VGA Adapter
(1024x768) 16Color Mode;VGA 1024
```

as your video adapter, whichever is appropriate for your hardware configuration. You may now begin using GEM.

Software drivers - GEM/3 versions 3.0 and 3.1

Note: Be sure that your VGA monitor can display 800 x 600 and/or 1024 x 768 pixel resolution. Choosing a higher resolution than your monitor is capable of displaying produces unsatisfactory results.

The following instructions are applicable to users of the GEM/3 Versions 3.0 and 3.1.

The GEM/3 driver files require a new GEMSETUP.TXT file to be installed in place of the one on the GEM/3 System Master Disk (Ver. 3.0), or the GEM/3 Master Disk (Ver. 3.1). The drivers make full use of the extended graphics modes of the Gateway 2000 VGA graphics adapter. Your VGA monitor must be capable of displaying these resolutions in order to utilize this driver.

▶ To install GEM/3:

1. Make a DISKCOPY of the System Master Disk (Ver. 3.0), or the Master Disk (Ver. 3.1). Use this copy in place of the original during installation.

   Example:

   ```
   C:DISKCOPY A: B: ...or

   C:DISKCOPY A: A:
   ```

2. Copy GEMSETUP.V30 from the STAR\GEM to the newly diskcopied diskette. The following commands assume the newly diskcopied diskette is in drive B:

   For Version 3.0,

   ```
   COPY C:\STAR\GEM\GEMSETUP.V30 B:GEMSETUP.TXT
   ```

For Version 3.1,

```
COPY C:\STAR\GEM\GEMSETUP.V31 B:GEMSETUP.TXT
```

3. Insert a blank diskette in drive A: Then, using the standard DOS **format** utility, format the blank diskette by typing the following command:

```
C:FORMAT A: /V
```

4. The /V option tells DOS to ask for a diskette volume label. Format prompts for the label by displaying:

```
Volume label? (11 characters,

ENTER for none.
```

   At the prompt, type the following label in upper case letters:

```
GEM SCREEN2
```

5. Copy the following files from GEM/3 Screen Disk #2 (both Ver. 3.0 and 3.1) to the newly formatted diskette. The following sample commands assume the GEM/3 disk is in drive A: and the newly formatted diskette is in drive B:

```
COPY A:GEMVDI.EXE B:

COPY A:MDGEM?.SYS B:
```

6. Copy the following files from the STAR\GEM subdirectory to the newly formatted diskette. The following commands assume that the newly formatted diskette is in drive B:

```
COPY C:\STAR\GEM\SD*.VGA B:
```

   Now the installation of VGA extended mode drivers is a 2-step process.

   First, install GEM as instructed in the GEM manual, selecting . . .

```
IBM 16Color VGA for PS/2
(640x480) or Compatible
```

   as the video driver. Complete the GEM installation normally. After completing installation, it is a good idea to start GEM to ensure that it operates properly before performing the next step.

Assuming GEM worked properly with the IBM VGA driver loaded, reinsert the System Master Disk and run GEMPREP again. This time, choose to change the existing configuration. Change the video adapter part of the configuration in order to load the Gateway 2000 VGA graphics adapter.

Select from the following:

```
SpeedSTAR VGA Adapter
(800x600) 16-Color Mode

SpeedSTAR VGA Adapter
(1024x768) 16-Color Mode
```

The program now prompts you to insert Screen Disk #2 Instead of GEM Screen Disk #2, insert the newly formatted diskette with drivers copied from the SpeedSTAR VGA Utilities & Drivers diskette. The driver loads and the program concludes. You may now begin using GEM.

Software drivers - LOTUS 1-2-3 release 2.01 and 2.2, and LOTUS Symphony release 2.0

The drivers in the STAR\LOTUS subdirectory of the SpeedSTAR VGA Utilities & Drivers diskette are text drivers for Lotus 1-2-3 release 2.01 and 2.2 and Symphony release 2.0.

These drivers support all the text modes of the Gateway 2000 VGA card:

☐ 80 x 25

☐ 80 x 60

☐ 132 x 25

☐ 132 x 28

☐ 132 x 44.

One driver is dedicated to each of these five modes; each of these drivers, when selected as the active text display for a Lotus product, causes individual Lotus programs and utilities (1-2-3, Translate, Symphony, Printgraph, etc.) to display in the selected format.
For example, if the 132 x 28 driver is selected in the installation procedure, as described below, the spreadsheet displays 132-columns by 28 rows of text when Lotus 1-2-3 is run.

In addition, the drivers include an "All Color Text Modes" driver which supports all five text display modes of the Gateway 2000 VGA card.

When you select this driver you are offered the choice of any of the five display modes. This allows switching between 80-column and 132-column displays without reconfiguring your Lotus program.

Because the Gateway 2000 VGA card is EGA-compatible, the Enhanced Graphic Adapter drivers should be installed as the text display.

When initially installing the EGA drivers, it is important that you install the drivers (called IBM Enhanced Graphics in 1-2-3 and Separate in Symphony).

Before installing the Gateway 2000 VGA text drivers, read GETTING STARTED in the Lotus 1-2-3 or the Lotus Symphony documentation.

▶ To install the text drivers:

The Lotus Install program permits new drivers to be added to the driver library with the *add new drivers to library* option of the Advanced Options Menu. Once the Gateway 2000 VGA text drivers are added to the library, select them via the *modify current driver set* option of the Advanced Options Menu.

After copying the files from the Lotus diskettes to the hard disk as instructed in the Lotus documentation, copy the drivers in the STAR\LOTUS subdirectory to the subdirectory which contains the Lotus 1-2-3 or Lotus Symphony files.

▶ To copy drivers to the 1-2-3 or Symphony subdirectory:

1. At the DOS C: prompt change to the subdirectory which contains your Lotus files. Select the correct command depending on the Lotus software you have.

2. Type:

   ```
   COPY C:\STAR\LOTUS\*.DRV          <Enter>
   ```

   This copies the drivers from the STAR\LOTUS subdirectory to your Lotus subdirectory.

3. Perform the First-Time Installation of your Lotus product. The Install program guides you through the procedure of selecting the drivers you want. Remember that Gateway 2000 VGA supports the IBM Enhanced Graphics format, so select the EGA Adapter for the initial text and graphics screen display device.

4. When driver selection is completed, press the F10 function key to display the current driver selections.

   After completing your selections, the Install program saves the selected drivers in a file, or driver set, called 123.SET for Lotus 1-2-3 or LOTUS.SET for Lotus Symphony.

5. At this point the Main Menu's Install program appears on the screen. Select *Advanced Options* and press <Enter>.

6. The Advanced Options Menu appears on the screen. Select *add new drivers to library* and press <Enter>.

7. The Install program asks you to press <Enter>. This step creates a file named SINGLE.LBR which contains the Gateway 2000 VGA drivers.

8. The Advanced Options Menu appears on the screen. Select *modify current driver set* and press <Enter>.

9. The current drivers selected appear on the screen. Select *Text Display* and press <Enter>.

10. The text display drivers appear on the screen. Select the VGA driver to use and press <Enter>. The available drivers for VGA are:

    ☐ VGA Adapter (All Color Text Modes)

    ☐ VGA Adapter (80 x 25 Color Text Only)

    ☐ VGA Adapter (80 x 60 Color Text Only)

    ☐ VGA Adapter (132 x 25 Color Text Only)

    ☐ VGA Adapter (132 x 28 Color Text Only)

    ☐ VGAAdapter (132 x 44 Color Text Only).

11. The currently selected drivers appear. Verify that the VGA driver selected appears in the Text Display field. Select *Return to Menu* and press <Enter>.

12. The Advanced Options Menu appears on the Screen. Select *Save Changes* and press <Enter>.

13. The Install program prompts you for the name of the driver set. To name the driver set, type a name and press <Enter>. For example, if the VGA 132 x 28 Display is selected, the driver's name is VGA28. If no name is entered, Lotus 1-2-3 names the driver 123, while Symphony names the driver LOTUS. Unless you explicitly specify another driver set, the default driver sets are used when running programs.

14. The Install program informs you that the driver set has been saved. Press <Enter>, and the Exit Menu appears on the screen.

Create additional driver sets at any time by selecting the *Advanced Options Menu, Modify Current Driver Set,* and *Save Changes* options of the Install program menu.

To create additional driver sets, press <Enter> to return to the Main Menu. Be sure to use a different name for each driver saved.

15. Refer to the Starting and Ending chapter of the Lotus GETTING STARTED documentation for information about starting Lotus 1-2-3, or Symphony. Some examples of how to select different driver sets follow.

Type:

```
LOTUS (Lotus 123), or
ACCESS (Symphony)
```

to run the programs using the default driver sets named 123, or LOTUS.

If there is a driver called VGA28, type:

```
LOTUS VGA28, or
ACCESS VGA28
```

to set the display to 132 x 28 mode.

The most convenient way to switch modes is to install the All Color Text Modes driver (SIMBOFLY.DRV) and then use the pop-up VGA mode selection menu provided in both Lotus 1-2-3 and Symphony. To activate this menu press the <Ctrl> and <A> keys simultaneously. Select the desired mode by moving the cursor until the mode is highlighted, and then press <Enter>. The system beeps indicating the choice is accepted. Exit to DOS, restart the program, and the new display mode is in effect.

Software drivers - Ventura Publisher versions 1.1 - 2.0

Note: Be sure that the VGA monitor can display 800 x 600 and/or 1024 x 768 pixel resolution. Choosing a higher resolution than the monitor is capable of displaying brings about unsatisfactory results.

The following instructions are for users of Ventura Publisher Versions 1.1 - 2.0. Install the Ventura 800 x 600 and 1024 x 768 driver files found in the STAR\VENTURA subdirectory *after* Ventura Publisher has been installed on your system. The drivers make full use of the 800 x 600 or 1024 x 768 graphics modes of the Gateway 2000 VGA graphics adapter.

▶ To install the VGA driver:

1. Follow the Ventura installation instructions.
2. When asked to select a video adapter, choose:

```
E-IBM Personal System/2  (640x480)
two colors. (Version 1.1)

E-IBM VGA or Compatible (640x480)
2 color. (Version 2.0)
```

Note: Make a back-up of the .BAT file before attempting to make any modifications to it.

3. Complete Ventura Publisher installation and verify proper operation using the installed IBM driver.
4. Exit Ventura Publisher and use the DOS file editor to browse the VP.BAT or VPPROF.BAT file (installed in the root directory by default).
5. Copy both of the SDxxx.VGA files from the STAR\VENTURA subdirectory to the \VENTURA directory. Type:

```
COPY C:\STAR\VENTURA\SD*.* C:\VENTURA
```

6. Modify the /S=switch to:

```
/S=SD800.VGA ...or
/S=SD1024.VGA
```

7. Save the modified file back to the root directory with the VP.BAT or VPPROF.BAT file name.
8. Now Ventura Publisher boots into the selected mode.

Software drivers - WordPerfect version 5.0
for 800 x 600 and 1024 x 768 resolution

The following instructions apply to users of WordPerfect 5.0 at 800 x 600 or 1024 x 768 resolution.

The drivers contained in the STAR\WP subdirectory are used to enable WordPerfect 5.0 to be displayed at 800 x 600 and 1024 x 768 resolution. Simply copy the drivers to the disk directory where WordPerfect resides. Copy drivers WP800.WPD and WP1024.WPD for use with WordPerfect 5.0.

To choose the resolution desired:

1. From the document screen displayed after entering WordPerfect, press SHIFT/F1 to enter the Setup menu.
2. From Setup, choose option 3. This brings up the Get Setup: Display menu.
3. From the Get Setup: Display menu, choose option 5 *Graphics Screen Type.*
4. From the Get Setup: Graphics Screen Type menu, choose either:

```
VGA Adapter 800x600 16 color, or
VGA Adapter 1024x768 16 color
```

5. Exit from the menus and begin using WordPerfect.

Software drivers - WordPerfect version 5.1
for 800 x 600 and 1024 x 768 resolution

The following instructions apply to users of WordPerfect 5.0 at 800 x 600 or 1024 x 768 resolution.

The driver contained in the STAR\WP subdirectory is used to enable WordPerfect 5.1 to be displayed at 800 x 600 and 1024 x 768 resolution. Simply copy the driver, WP51ET4.VRS, to the disk directory where WordPerfect resides.

To choose the resolution desired:

1. From the document screen displayed after entering WordPerfect, press SHIFT/F1 to enter the Setup menu.
2. From Setup, choose option 2-*Display*. This brings up the Get Setup: Display menu.
3. From the Get Setup: Display menu, choose option 2 *Graphics Screen Type.*
4. From the Get Setup: Graphics Screen Type menu, choose the *Extended VGA* option, which lets you choose from:

```
VGA 1024x768 16 color

VGA 1024x768 256 color

VGA 800x600 16 color

VGA 800x600 256 color

VGA 640x480 16 color

VGA 640x480 256 color
```

5. Exit from the menus and begin using WordPerfect.

Software drivers - WordPerfect version 5.0

for 132-column text modes

Set Gateway 2000 VGA to one of the 132-column text modes. See page 9-12, "The Extended-Column Modes".

Use any of the three 132-column modes (132 x 25, 132 x 28, or 132 x 44) and type WP to start WordPerfect.

WordPerfect usually detects the screen size automatically. If for some reason it does not, you can start WordPerfect using the /SS switch (i.e., WP/25132). Note the reverse order in which the /SS switch is written (*rowscolumns*), and be sure the switch setting matches the Gateway 2000 VGA adapter setting. Refer to "Options for Starting WordPerfect" in the WordPerfect user manual.

Software drivers - WordStar release 4.0

for 132-column text modes

The 132-column modes for WordStar Release 4.0 are set through the WSCHANGE.EXE file. A 132-column mode also needs to be set on the Gateway 2000 VGA adapter prior to loading a reconfigured WordStar file for 132-column capability. Follow the instructions carefully to ensure that your new version is completed correctly, and that no damage results to the original files.

▶ To install the text modes:

1. Make a copy of the WS.EXE file, renaming it to indicate that the new copy is the 132-column version.

   Example:

   ```
   C:COPY WS.EXE WS132.EXE
   ```

This provides separate WordStar files, one for normal 80-column, and one for 132-column operation.

2. Load the WSCHANGE file.
3. Type the filename to install as WS132 .
4. Type the filename to save any changes to as WS132
5. Choose *A Console* from the Main Installation Menu.
6. Choose *A Monitor* from the Console menu.
7. Choose *C Screen sizing* from the Monitor menu.
8. Specify the Height and Width measurements that best suit your needs (i.e., 25 and 132) and exit the menu.
9. Exit through the remainder of the menus and WSCHANGE.

You are now finished making a 132-column version of WordStar. The next step is to put the Gateway 2000 VGA into the proper 132-column mode prior to loading WS132. This is most easily accomplished with a batch file.

► To create a batch file:

1. Use EDLIN or any text editor capable of saving files in ASCII form to create a file. Choose a name other than WS or WS132 since these names already belong to WS.EXE and WS132.EXE. For illustrative purposes, let's use WORDSTAR.BAT. This file may also be created using the DOS command, COPY CON (e.g., WORDSTAR.BAT).
2. Your batch file needs only two lines:

```
VMODE 132x25
WS 132
```

3. Type WORDSTAR at the DOS prompt and the batch file first changes the mode and then loads WS132. Upon exiting WS132, the mode reverts to a standard

80 x 25. These instructions may be used to provide similar 132-column modes for WordStar Professional.

Diagnostic test

Included in the STAR\UTIL subdirectory is a test program called VDIAG.EXE that can assist in verifying that the VGA card and attached display monitor are working properly.

To start the diagnostic test:

1. At the DOS prompt, type:

```
VDIAG   <Enter>
```

2. Test in either the monochrome of color modes. Diagnostics for the various write modes are executed and any errors that occur are shown on the screen.

VDIAG.EXE is a good tool for testing resolution and color palette. The shades of color vary from monitor to monitor.

Color or monochrome text modes

The Gateway 2000 VGA card BIOS supports the following text modes. These modes are not used by the IBM VGA. The numbers are in decimal except as a noted.

Mode	Col	Row	Length of memory map
22 hex	132	44	132x44x2=11616=2D60 hex
23 hex	132	25	132x25x2=6600=19C8 hex
24 hex	132	28	132x28x2=7392=1CE0 hex
2A hex	100	40	100x40x2=8000=1F40 hex
26 hex	80	60	80x60x2=9600=2580 hex

Select the 132-column modes the same as the standard modes 0-7 and D-13:

1. Place a "0" in register AH to indicate *select mode* function
2. Place the mode number in register AL
3. Execute an INT 10h instruction, generating software interrupt 10 hex, invoking the BIOS to set the mode.

The above sequence is commonly used to access the BIOS from assembly language or from a machine-language driver, and is the standard BIOS interface for video mode select.

Text memory map

Like other text modes, the 132-, 100-, and 80-column color text memory map begins at B800:0000 (monochrome at B000:0000). Memory is organized with even bytes as character codes and odd bytes as attributes, again just like normal text. The row offset register (CRTC register 13 hex) is normally set to 66 (42 hex) to compensate for the greater width of the screen, and so the start of each row is 264 bytes after the start of the row above it, as opposed to the 80-column row offset register of 40 (28 hex) and 160 bytes from the start of one row to the start of the next.

As in the table above, the lengths of the 132-, 100-, and 80-column memory maps are longer than the normal 80 x 25 length of 4000 bytes.

Solving problems

If you have problems after installation, check the following to determine the cause:

☐ Ensure that all cables are properly connected, and that all plugs are firmly seated in their sockets

☐ Ensure that the display monitor is properly connected and that its power is turned ON.

Power OFF the computer system and all other connected devices before checking the following:

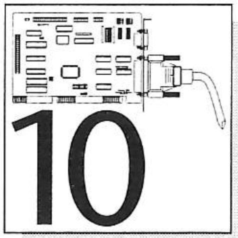
☐ Ensure that the switches on the Gateway 2000 VGA card are set properly and that the board is seated in the expansion slot

☐ Ensure that the system board's switches and jumpers are set properly for use with the Gateway 2000 VGA card

☐ Ensure that no other switch settings on the system board have been accidentally changed. Refer to Chapter 5, "The System Board" to determine the correct switch settings.

If checking these items does not locate the problem, there may be a malfunction of the computer system, display monitor, or the VGA card.

Consult Gateway 2000 Technical Support for assistance in locating the problem.



Serial and Parallel Ports

10

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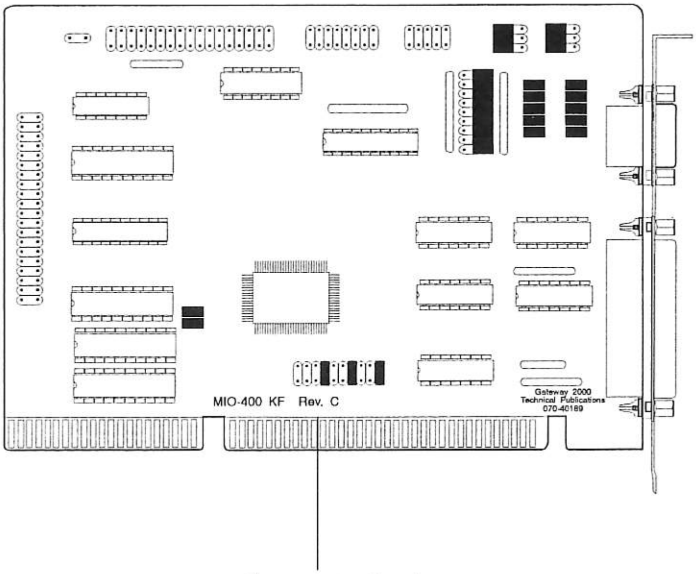
Important!

This chapter describes the MIO-400KF Rev. C card ***only***. Earlier cards (Rev. B, for example) are nearly identical in appearance, but the jumper locations and settings are different.

The card's revision is stamped just below JP9. If you have a Rev. B or earlier card, contact Gateway 2000 and request the correct manual (Part # 070-00727).



The revision level is stamped here

Introduction

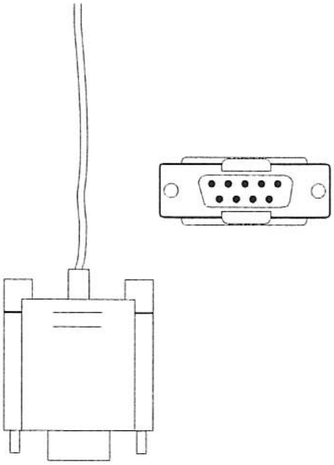
Your system includes an I/O card that provides serial and parallel interface ports. In this chapter, we introduce you to both types of ports, and describe the connection points and jumpers on the I/O card.

The I/O card also provides the interfaces for the floppy and hard disks. The disk interfaces are discussed in earlier chapters.

About serial interface ports

A *serial interface* port (often referred to as an *RS-232C* or *asynchronous communications* port) can connect modems, printers, mice, and other peripherals to your computer system. Serial ports are also used to transfer data to other computer systems. For example, if you have a notebook computer, you can transfer data back and forth between the notebook and your Gateway 2000 system, using each computer's serial port.

The serial interface ports in your system are accessed from the rear panel. The connector for the first Com port is on the I/O card's mounting bracket. The connector for the second port is located in a cutout in the rear panel; it connects to the I/O card with a ribbon cable.



DB9 connector.

The serial interface port on your Gateway 2000 system (and most other computers) is a 9-pin DB9 connector. Older computer systems (and many peripherals) have 25-pin DB25 connectors. Don't worry if you need to connect to a peripheral equipped with a 25-pin connector. Even though the connectors have different numbers of pins, they can be connected with the proper cable. Pinouts for DB9 and DB25 serial ports are shown in Table 10-1.

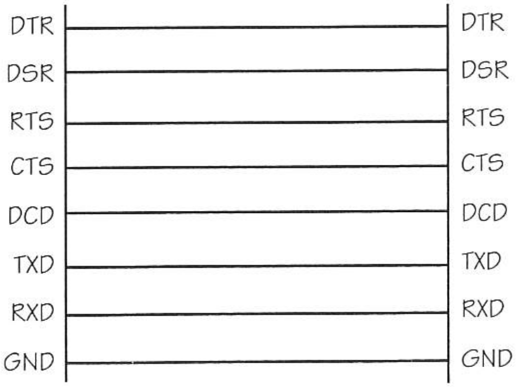
Table 10-1. Serial interface port signals and connector pinouts.

Signal	name	DB9 pin	DB25 pin
DCD	Data Carrier Detect	1	8
RX	Receive Data	2	3
TX	Transmit Data	3	2
DTR	Data Terminal Ready	4	20
GND	Signal Ground	5	7
DSR	Data Set Ready	6	6
RTS	Request to Send	7	4
CTS	Clear to Send	8	5
RI	Ring Indicator	9	22

Serial interface compatibility issues

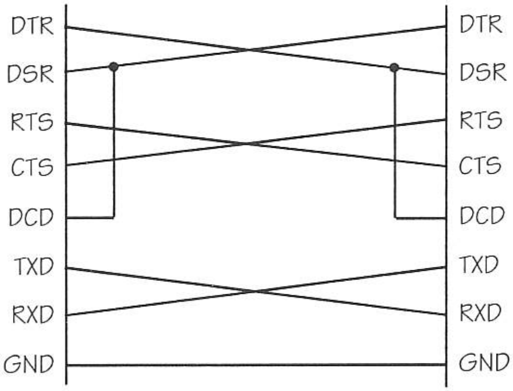
There are so many different ways to use serial ports that obtaining a correctly wired cable for your particular application can sometimes be difficult. Here is some information to help you sort out potential problems with serial interface cables.

There are two types of serial devices: DTE (Data Terminal Equipment) and DCE (Data Communications Equipment). In theory, whenever two serial devices are connected together, one is a DTE, and the other is a DCE. This is always true when connecting a modem (DCE) to a computer (DTE). In this case the pins in the cable can be connected straight through, as shown below.



Normal serial cable wiring.

Since both computers and printers are DTE devices, you need a special cable or adapter called a *null modem* to connect them together. A null modem cable switches several signals, as shown below.



Null modem serial cable wiring.

If you are trying to hook up a peripheral and it refuses to work, one of the first things to try is to install a null modem adapter between the cable and the peripheral.

An even better solution is provided by the I/O card installed in your Gateway 2000 system. This card allows you to configure the serial port as either a DTE or a DCE device by moving jumpers on the card as described later in this chapter. The result is that just about any cable can be used to connect to just about any peripheral.

We say "just about" because there is one other problem area in the serial interface connection. The RS-232C specification that describes how a serial port should work includes a variety of signals that can be used by one device to inform another device whether it is or is not ready to communicate. Unfortunately, some manufacturers use these signals, and others don't, which often leads to a compatibility problem. Generally, this can be solved by wiring the RTS, CTS, and DCD pins together. If you have a Gateway 2000 I/O card, you can accomplish the same thing by simply moving some jumpers on the card.

About COM ports

Up to four serial ports can be installed simultaneously in a system. The first port is labeled COM1, the second COM2, and so forth. Generally, the expansion card containing the I/O port has a set of switches or jumpers that allow you to assign the port to any of the four COM port numbers. Never assign more than one device the same COM port number!

Internal modems are also assigned COM port numbers, and we frequently talk to users whose serial port problems turn out to be caused by having a serial port and a modem assigned to the same COM port number.

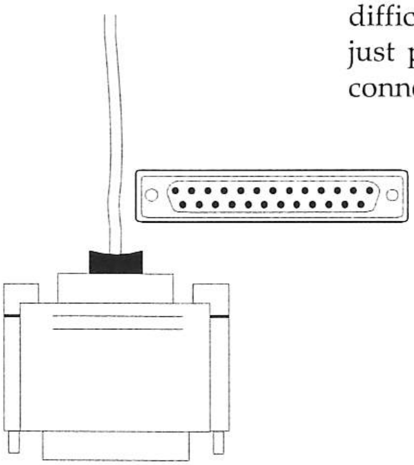
The only way to find out which COM ports are in use in your system is to remove any cards with a COM port and check their jumper or switch settings against the manual. If one or more devices have the same COM port number (COM2, for example) you'll have to change the settings for one of the cards to another, unused COM port number, or else disable the port completely.

Another factor to consider is that MS-DOS has a difficult time dealing with more than two COM ports simultaneously. Yes, you *can* install and use four COM devices in your system, as long as you don't use all of them *at the same time*. If you attempt to use more than two ports simultaneously, you may run into problems.

Finally, you should be aware that you need to use the same communications parameters on the serial ports on both your computer system and the peripheral it is connected to. These parameters are baud rate, parity, number of data bits, and number of stop bits. If, for example, your computer is set for a baud rate of 2400 bps, and your printer is set for 9600, you won't be able to print anything other than gibberish. See the instruction manual for your software and/or peripherals for information about setting these parameters.

Using parallel interface ports

Parallel ports (sometimes referred to as *Centronics* ports) are used almost exclusively for printers. The parallel port on Gateway 2000 systems uses a 25-pin, DB25 connector. Parallel interface devices have achieved a high level of standardization, so you shouldn't have any difficulty interfacing a parallel printer to your system — just plug it in. The pinouts for the parallel interface connector are shown in Table 10-2.



DB25 connector.

Table 10-2. Parallel interface port connector pinouts.

Signal name	**Pin**
-STROBE	1
DATA 0	2
DATA 1	3
DATA 2	4
DATA 3	5
DATA 4	6
DATA 5	7
DATA 6	8
DATA 7	9
-ACK	10
BUSY	11
PAPER EMPTY	12
+SELECT	13
-AUTO FDXT	14
-ERROR	15
-INIT	16
-SLCTIN	17
GROUND	18
GROUND	19
GROUND	20
GROUND	21
GROUND	22
GROUND	23
GROUND	24
GROUND	25

The I/O expansion card

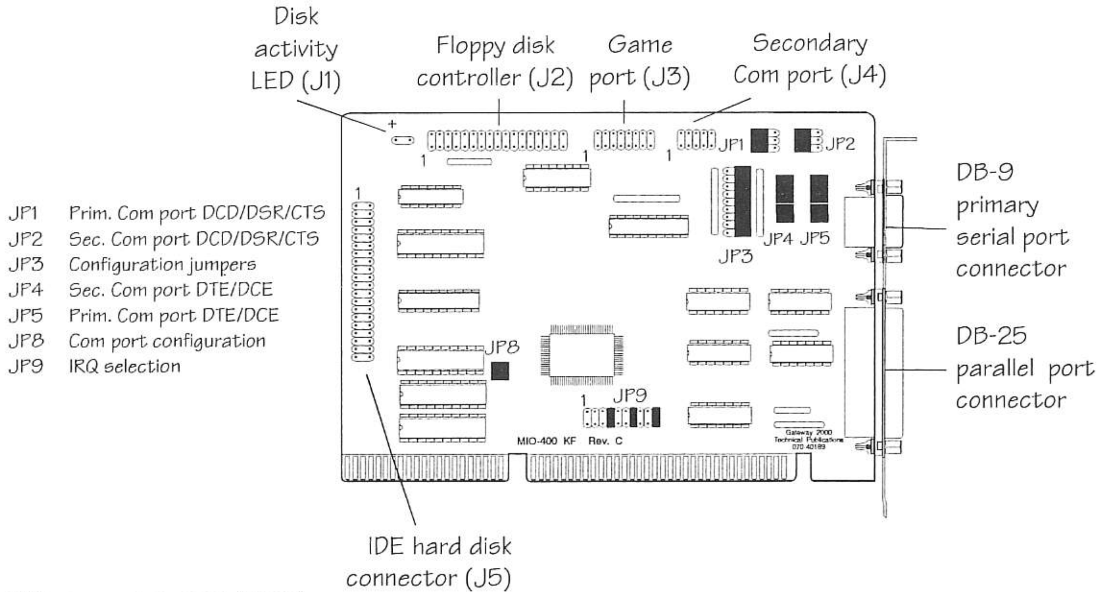
Your Gateway 2000 system is supplied with a versatile I/O expansion card. Standard features of this card include:

- ❑ Two RS-232C serial interface ports to be used with mouse, modem, serial printer, remote display terminal, or other serial devices
- ❑ A parallel printer port for connecting a parallel printer to the computer system
- ❑ A game adapter port which can be used with a joystick.

The card also includes floppy and IDE hard disk drive interfaces; these are discussed in previous chapters.

Card layout

The layout for the I/O expansion card is shown below.


Disk activity LED (J1)
Floppy disk controller (J2)
Game port (J3)
Secondary Com port (J4)
JP1
JP2
JP3
JP4
JP5
JP8
JP9
MIO-400 KF Rev. C
DB-9 primary serial port connector
DB-25 parallel port connector
IDE hard disk connector (J5)
JP1 Prim. Com port DCD/DSR/CTS
JP2 Sec. Com port DCD/DSR/CTS
JP3 Configuration jumpers
JP4 Sec. Com port DTE/DCE
JP5 Prim. Com port DTE/DCE
JP8 Com port configuration
JP9 IRQ selection

I/O expansion card layout.

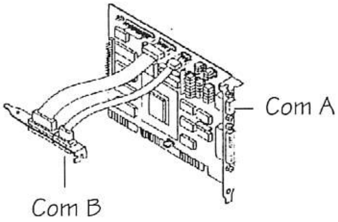
Parallel printer port

Table 10-3. Parallel port addresses.

Port	Addresses
LPT1	3BC-3BE Hex
LPT2	378-37A Hex
LPT3	278-27A Hex

The parallel port is compatible with any peripheral or other device designed to interface with a standard Centronics-type parallel port. The parallel port can be assigned as LPT1, LPT2, or LPT3 and uses the system I/O addresses shown in Table 10-3.

Serial port



The I/O card has two RS-232C asynchronous serial ports (often referred to as COM ports) which can connect to printers, modems, or other serial devices. The serial ports can be configured as either DTE or DCE devices. The primary serial port has a male DB9P connector, which is located on the I/O card bracket.

The secondary serial port connector on the I/O card is a 10-pin connector (J4). The interface cable for the secondary serial port has a DB25P connector at one end and a 10-pin rectangular connector at the end that connects to the I/O card. Connect it to the board at the connector labeled J4 ComB. The colored stripe on the ribbon cable goes to the pin 1 side of the connector on the card. Proper cable installation is critical; your serial device and I/O card may be damaged by improper cable orientation.

Table 10-4. Serial port addresses.

Port	Addresses
COM 1	3F8-3FF Hex
COM 2	2F8-2FF Hex
COM 3	3E8-3EF Hex
COM 4	2E8-2EF Hex

The serial ports use the system I/O addresses shown in Table 10-4.

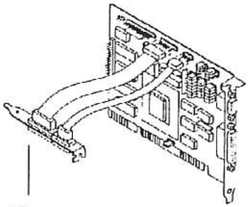
Serial port adapter cable

The wiring diagram for the DB9S to DB25P adapter cable is as shown in Table 10-5.

Table 10-5. Adapter cable wiring.

Signal name	DB9S connector	DB25P connector
DCD (Data Carrier Detect)	1	8
RX (Receive Data)	2	3
TX (Transmit Data)	3	2
DTR (Data Terminal Ready)	4	20
GRD (Signal Ground)	5	7
DSR (Data Set Ready)	6	6
RTS (Request To Send)	7	4
CTS (Clear To Send)	8	5
RI (Ring Indicator)	9	22

Game adapter port



One game adapter port is provided for connection to a joystick. The game port is a 15-pin connector that attaches to J3 with a ribbon cable. The colored stripe on the ribbon cable goes to the pin 1 side of the connector on the card.

The I/O port address for the game port is 200-207h. The game port pinout is as shown in Table 10-6.

Note: Many users install an additional game port card that supports two joysticks. If you install such a card, make sure you disable the game port on this I/O card, as described on page 10-15 of this manual.

Table 10-6. Game port pinouts.

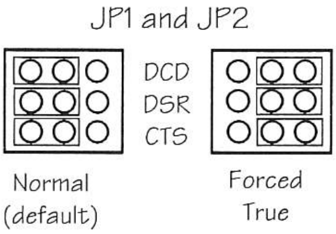
Line name	J2 pin	DB15S adapter cable output
+5VDC	1	1
Button 4	2	2
Position 0	3	3
Ground	4	4
Position 1	6	6
Button 5	7	7
+5VDC	8	8
+5VDC	9	9
Button 6	10	10
Position 2	11	11
Ground	12	12
Position 3	13	13
Button 7	14	14
+5VDC	15	15

Jumper settings

The I/O card has several jumpers, with the settings and functions shown on the following pages.

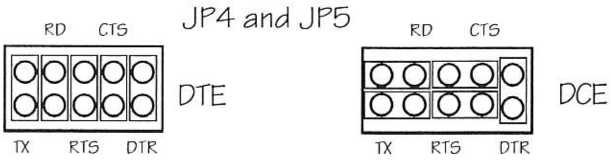
JP1 & JP2: Serial DCD, DSR and CTS lines

You can set the serial port DCD, DSR, and CTS lines to either "normal" (default setting) or "forced true;" each line can be set independently. Use JP1 to set the primary serial port, and JP2 to set the secondary serial port.



JP4 & JP5: Serial port DTE or DCE selection

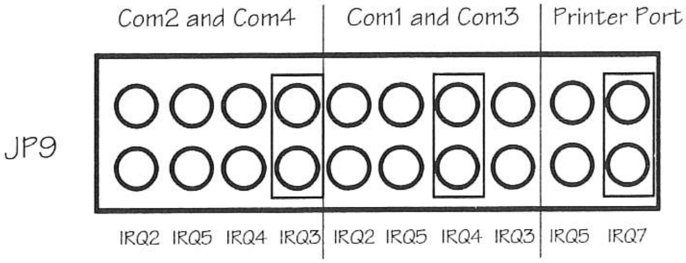
You can configure the serial ports as DTE (default) or DCE with JP4 and JP5. If you are connecting the port to an external modem, you should set it up as DCE. If you are connecting the port to a printer, set it up as DTE. (Note, however, that these recommendations assume that you have the correct type of cable for your application. If in doubt, try both DCE and DTE settings!)



Use JP4 to set the secondary serial port and JP5 to set the primary serial port.

JP9: IRQ selection

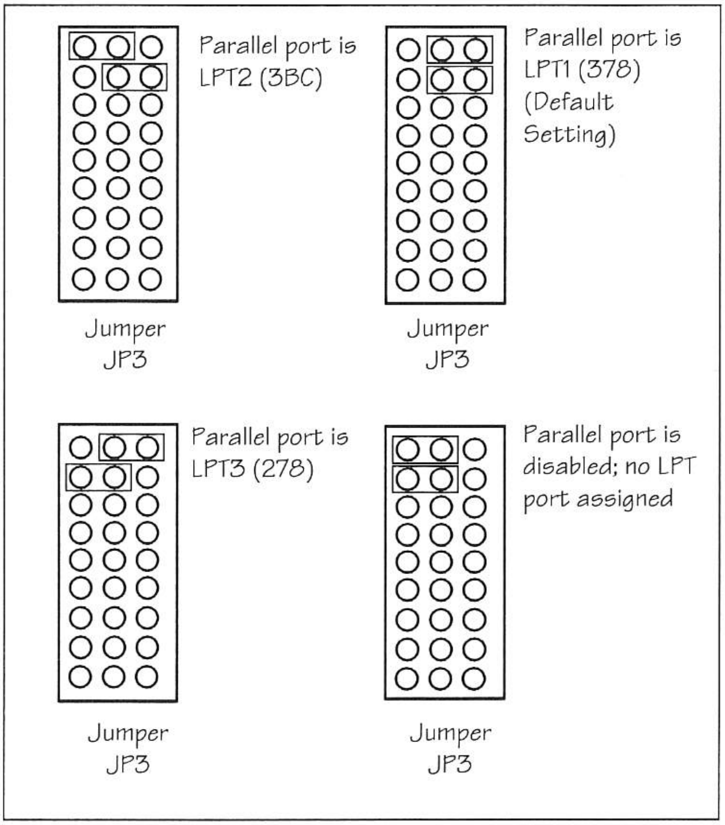
Use JP9 to select the IRQ (interrupt) settings for the serial and parallel ports. The jumper positions for the default settings are shown.



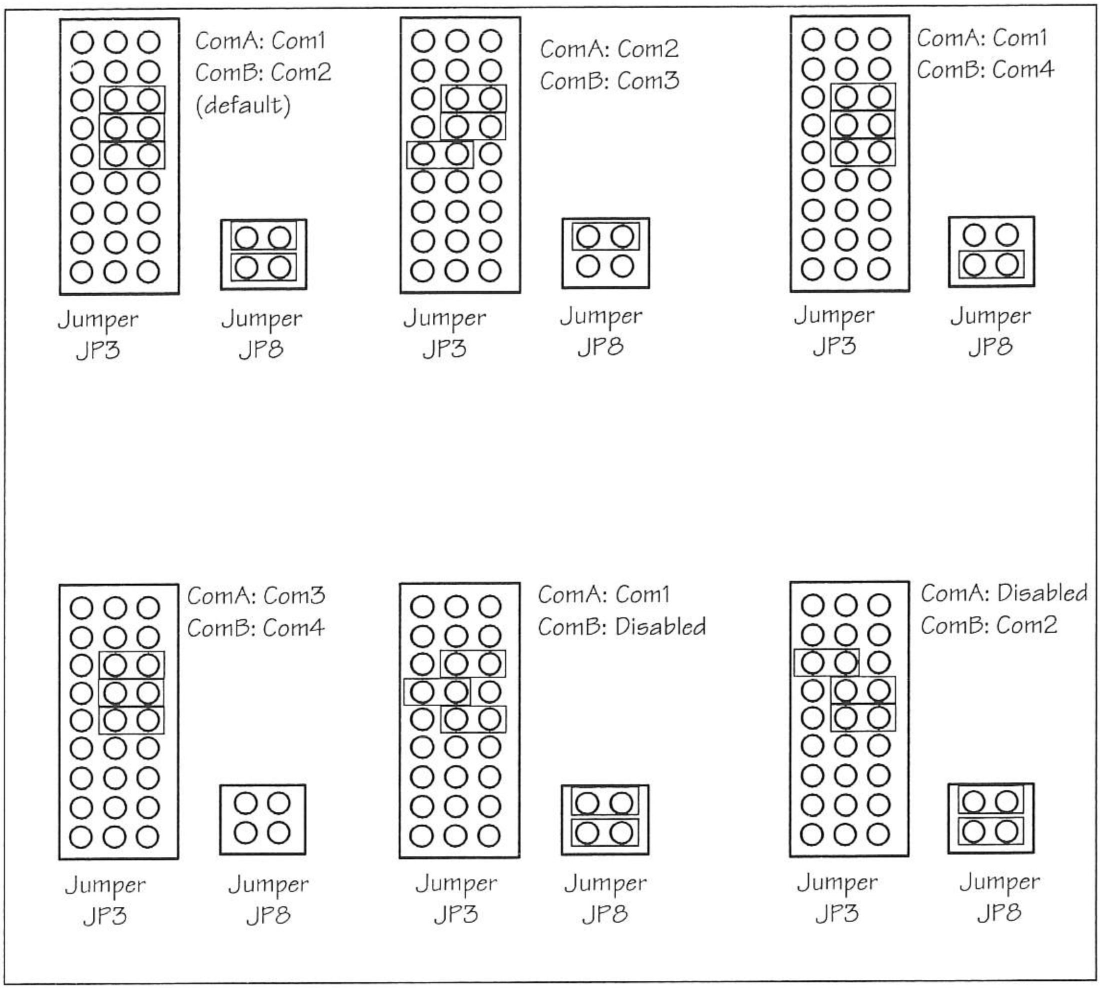
Use IRQ7 if the printer port is set to LPT1. Use IRQ5 if the printer port is set to LPT2.

JP3 & JP8: Configuration settings

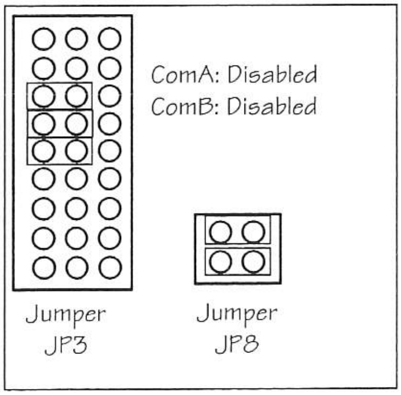
JP3 and JP8 are used to configure the serial and parallel ports. JP3 also selects whether the various functions on the board (serial ports, parallel port, game port, floppy disk interface, and IDE hard disk interface) are enabled or disabled.

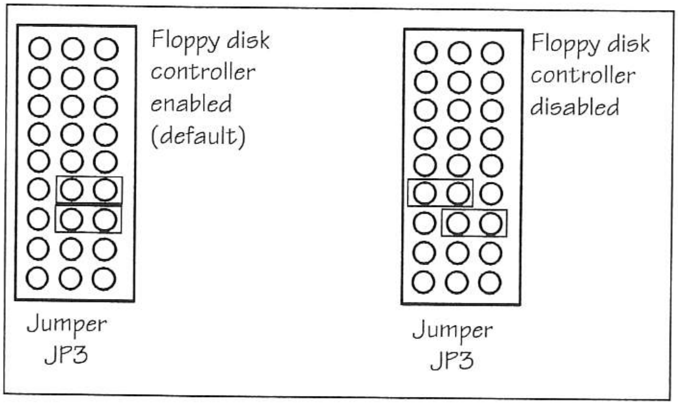

Parallel port is LPT2 (3BC)
Jumper JP3
Parallel port is LPT1 (378) (Default Setting)
Jumper JP3
Parallel port is LPT3 (278)
Jumper JP3
Parallel port is disabled; no LPT port assigned
Jumper JP3

The top two sets of pins on JP3 select the LPT port and I/O address for the parallel port. The parallel port can be disabled if necessary.

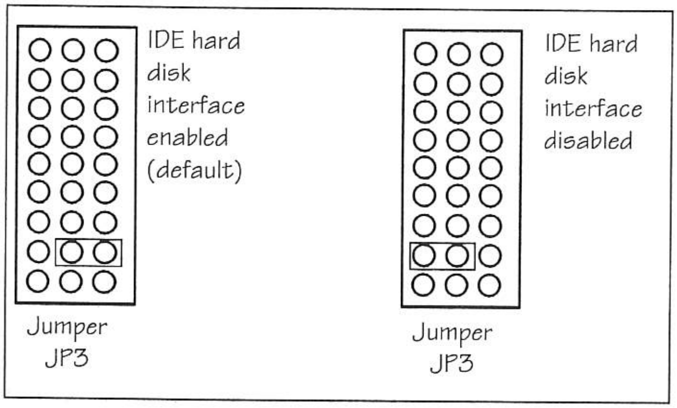


JP8 and the third through fifth sets of pins on JP3 select the Com ports for the primary (Com A) and secondary (Com B) serial ports. The serial ports can be completely disabled if necessary.

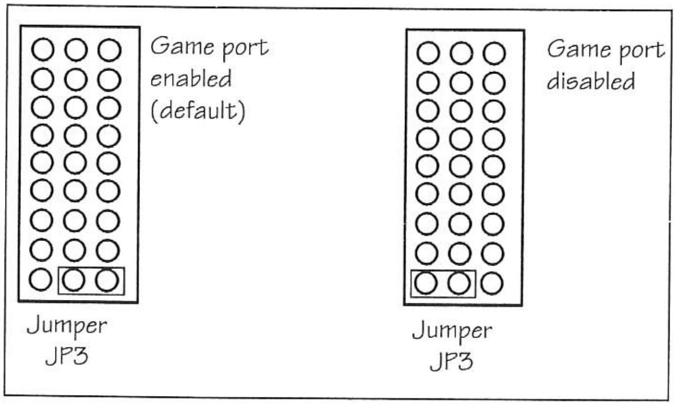



Floppy disk controller enabled (default)
Jumper JP3
Floppy disk controller disabled
Jumper JP3

The sixth and seventh set of pins on JP3 select whether the floppy disk drive controller is enabled or disabled.

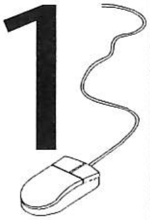

IDE hard disk interface enabled (default)
Jumper JP3
IDE hard disk interface disabled
Jumper JP3

The eighth set of pins on JP3 select whether the IDE hard disk drive controller is enabled or disabled.



The ninth set of pins on JP3 select whether the game port is enabled or disabled.

11



Using the Mouse

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Introduction

The mouse is a hand-held pointing device that helps you use your computer more easily and efficiently. With its speed, accuracy, and simplicity, the mouse will become an indispensable part of your work environment.

You can use your mouse to move or delete text in an instant, insert a value into a spreadsheet, or choose a command on a menu. All you do is point to an area on the screen, and then click a mouse button.

This chapter describes how to connect the mouse hardware, install the mouse software, and use the mouse.

The MREADME.DOC file

The program disk containing the mouse files may include a file named MREADME.DOC. You should read this file for additional information that became available after this book was printed.

▶ **To read this file on your screen:**

1. Start your computer.
2. Insert the distribution disk that contains the mouse files into drive A.
3. At the system prompt, type:

```
type a:mreadme.doc
```

Installing the mouse

There are three versions of the mouse to accommodate different systems and configurations. The remainder of this section provides instructions for installing each type of mouse. Read only the instructions for installing the type of mouse you have.

Connecting the 9-pin serial mouse

▶ **To connect the 9-pin serial mouse to your computer:**

1. Turn your computer off.
2. Locate an available 9-pin serial port on the back of your computer (this port may be oriented either vertically or horizontally).
3. Insert the serial connector into the serial port and then tighten the screws on the serial connector.
4. Turn on your computer.

Connecting the PS/2 mouse

▶ To connect the PS/2 mouse to your computer:

1. Turn off your computer.
2. Locate an available 6-pin circular port on your computer (it should correspond to the 6-pin connector on your mouse).
3. Insert the mouse connector into the PS/2 circular port.
4. Turn on your computer.

Some computers have a circular port that looks similar to the PS/2 circular port, but is incompatible with the connector on the PS/2 mouse cable. If you can't connect the mouse cable easily, don't force it. Locate the compatible circular port or contact Gateway 2000 for assistance.

Installing the mouse software

Like most hardware products you use with your computer, the mouse needs software to make it run. The program disk that came with your mouse includes the software you need to set up and use the mouse.

What's on the disk

Use the mouse program disk right after you install the mouse hardware. The program disk includes:

☐ The Msetup program (used to set up the mouse software)

☐ Other mouse software (depending on the package you purchased).

What the Msetup program does

The Msetup program copies the mouse driver and the control panel to your hard disk or to a floppy disk that contains the DOS system files. The mouse driver is the file that lets the mouse work with your computer. The control panel is a utility program that lets you adjust the way the mouse responds as you move it.

Msetup copies only the mouse driver and the control panel from the program disk. To use any of the other mouse software, you must have your working copy of the program disk in the current drive.

Msetup asks if you want it to modify the AUTOEXEC.BAT file on your disk so that the mouse driver and the control panel load automatically each time you start the computer.

- ☐ If you answer "Yes," Msetup adds the lines "mouse" and "cpanel" to your AUTOEXEC.BAT file and, if you have installed the mouse software on a hard disk, adds the mouse directory to the path information. If Msetup cannot find the AUTOEXEC.BAT file, it creates the file and adds the appropriate commands.
- ☐ If you answer "No," Msetup does not modify your startup disk.

To load the mouse driver, type:

```
mouse
```

and press Enter at the system prompt each time you start your computer.

If you have a hard disk system, Msetup asks you to specify a subdirectory where you want the mouse files to be copied. If you press <Enter> without specifying a subdirectory, Msetup automatically copies the mouse files to a directory named "MOUSE1".

If you choose not to have Msetup modify the AUTOEXEC.BAT file, you should add the name of the mouse directory to the search path so that you can easily access the mouse driver later. For details, see the explanation of the path command in your DOS manual.

Deleting old versions of the mouse driver

If you want to copy the new mouse driver onto a disk that contains a previous version of the mouse driver, you should use the DOS del command to remove the old mouse driver (called MOUSE.COM) and the control panel (CPANEL.COM) from the disk before running the Msetup program. For more information, see the explanation of the del command in the DOS manual.

After you run the Msetup program, you must restart your computer to load the new version of the mouse driver if Msetup modified your AUTOEXEC.BAT file.

Running the Msetup program

▶ **To run the Msetup program:**

1. Start your computer's operating system.
2. Insert the program disk containing the mouse files into drive A.
3. At the system prompt, type:

```
a:msetup
```

and press Enter.

Follow the instructions on your screen to install the mouse software.

If you see the message "Driver not installed—Mouse not found" after running Msetup and restarting your system, there may be a problem with the system hardware or the mouse hardware. Make sure you installed the mouse hardware correctly before continuing.

If you have a Serial-PS/2 mouse attached to a serial port, ensure that the serial port is configured correctly. (COM1 uses IRQ4 and COM2 uses IRQ3).

If, after checking the mouse hardware installation and restarting the system, you still receive the error message, try connecting the mouse to another computer system to make sure that the mouse is not defective.

Removing the mouse driver from memory

You can remove the mouse driver from memory if you run an application that needs more free memory. Before removing the mouse driver from memory, you must exit all mouse-menu programs you are using. Also, before the following steps can be effective, you may need to remove any terminate-and-stay-resident programs you loaded after the mouse driver and control panel programs.

▶ To remove the mouse driver from memory:

If you are running a mouse menu program, type:

```
menu off
```

and press Enter at the system prompt (where *menu* is the name of the mouse-menu program). If you have installed the control panel, type:

```
cpanel off
```

and press Enter to remove it from memory.

To remove the mouse driver, type:

```
mouse off
```

and press Enter.

Using the mouse

This section describes the basic mouse techniques you use with all applications that support the mouse. You also learn how to adjust mouse sensitivity and select movement profiles using the control panel.

Basic mouse movements

You use four basic mouse techniques with most applications that support the mouse:

- ☐ Pointing
- ☐ Clicking
- ☐ Double-clicking
- ☐ Dragging.

Pointing

The mouse controls a pointer on the screen. The pointer can have a number of shapes. If you are running a graphics-based program, the pointer often appears as an arrow. If you are running a text-based program, the pointer often appears as a blinking box.

The rubber-coated ball in the mouse rolls within its socket when you move the mouse across the surface of your desk. The mouse translates the movement of the ball into signals that tell the computer how to move the pointer. The mouse doesn't require much surface space in which to move. Remember that the movement of the mouse on your desk determines the movement of the pointer on your screen. You can pick up the mouse and move it to a different spot on the desk without moving the pointer on your screen.

You move the pointer on the screen by moving the mouse over your desktop in the direction you want the pointer to move. Moving the mouse slowly results in small movements of the pointer, while moving the mouse faster produces larger movements of the pointer. This type of mouse-to-pointer relationship lets you cover large distances on the screen with a minimum of mouse movement, while helping retain precise control when the pointer approaches the desired object.

Clicking and double-clicking

Clicking means pressing and quickly releasing a mouse button. By pointing to something on the screen and then clicking a mouse button, you select what is underneath the pointer. Double-clicking means pointing to an object on the screen and quickly clicking a mouse button twice.

Dragging

Dragging means holding down a mouse button and moving the pointer. Dragging lets you select a portion of your screen or move objects around your screen.

The control panel

The control panel allows you to adjust the sensitivity of the mouse and select movement profiles that are appropriate for the application program you are running.

The mouse sensitivity is the ratio of actual mouse movement to pointer movement. Different applications may require different sensitivities. As you become more familiar with your mouse, you may want to change the sensitivity so you can work more quickly. Different mouse profiles cause the pointer to move greater or lesser distances across the display when you move the mouse at different speeds across your desk.

Loading the control panel

When you set up the mouse software, the Msetup program asks if you want to install the control panel so that it loads automatically whenever you start your computer. If you answer "Yes," Msetup modifies your AUTOEXEC.BAT file accordingly.

If you chose not to have the control panel load automatically, switch to the drive or directory that contains the mouse program files and type:

```
cpanel
```

and press Enter at the system prompt to load the control panel.

If you want to remove the control panel from memory, switch to the drive or directory that contains the mouse program files and type:

```
cpanel off
```

and press Enter at the system prompt.

Viewing the control panel

Whenever you are using the mouse with the control panel loaded, you can view the control panel by pressing <Ctrl> +<Alt> and either mouse button. (See Appendix A, "Mouse Command-Line Switches," for information on how you can change the key/mouse button combinations used to display the control panel.)

Changing the sensitivity level

The position of the marker and the number below the sensitivity bar indicate the current sensitivity level. The sensitivity level can vary from 5 to 100 in increments of 5. The default is 50.

To change the mouse sensitivity level:

1. With the control panel loaded, press <Ctrl>+<Alt> and either mouse button to display the control panel.
2. Point to the left arrow on the sensitivity bar if you want to decrease the sensitivity level; point to the right arrow if you want to increase the sensitivity level.
3. Click the left mouse button to move the marker in increments of five in the direction indicated by the arrow, or press and hold down the left mouse button to move the marker continuously.

The number representing the current sensitivity level changes to reflect the movement of the marker.

You also can change the sensitivity level by placing the pointer directly on top of the marker and, holding down the left mouse button, dragging the marker in the desired direction on the sensitivity bar.
Before you exit the control panel, test the changes you made by moving the pointer around your screen.

To put the new sensitivity level into effect and exit the control panel, point to OK and click the left mouse button.

If you don't want to save the change, point to Cancel and click the left mouse button.

Changing the mouse acceleration

The mouse acceleration, or mouse-movement profile, controls how far the pointer travels across your screen for a given speed of mouse movement. You can choose from among four supplied mouse pro files. The profiles are listed on the control panel. You can select a new mouse profile by using the control panel or by using command-line switches when you load the mouse driver.

When you use an accelerated mouse profile, for example, moving the mouse quickly, even only a small distance, moves the pointer farther across your screen than when you move the mouse slowly. A small, fast mouse movement can move the pointer completely across your screen, while a large, slow movement may move the pointer only an inch or two.

When you select a different mouse profile, you change the ratio between the distance the pointer moves on your screen and the speed of mouse movement.

▶ To select a new mouse profile using control panel:

1. Press <Ctrl>+<Alt> and either mouse button to display the control panel.
2. Point to the label corresponding to the desired mouse profile (Slow, Moderate, Fast, or Unaccelerated) and click the left mouse button.

You can test the new profile by moving the pointer around your screen. To put the new profile into effect and exit the control panel, point to OK and click the left mouse button.

To cancel the change and exit the Control Panel, click Cancel. To restore the original profile and leave the Control Panel on screen, click Reset.

Creating custom mouse profiles

Your mouse comes with four profiles on the control panel: Slow, Moderate, Fast, and Unaccelerated. You can also create custom mouse profiles that might better suit your needs. For example, you may want to create a two-speed profile that moves the pointer across your entire screen when you move the mouse at medium speed, but only a small distance when you move the mouse very slowly.

If you want to select a mouse profile automatically when the mouse driver is loaded, you can use command-line switches to specify the profile you want to use, as well as a custom mouse-profile file. You can also add command-line switches to the mouse command in your AUTOEXEC.BAT file so that they take effect each time you start your computer.

For more information on creating mouse-movement profiles, see "Creating a Custom Mouse Profile" found on page 11-17.

Cleaning the mouse

After an extended period of use your mouse may pick up some dust or lint. If you notice that the pointer does not move smoothly or that the ball does not move freely, you should clean your mouse.

▶ To clean the mouse:

1. Turn off the computer.
2. Turn the mouse upside down.
3. Remove the mouse ball cover.
4. Turn the mouse right side up. The ball should drop into your hand. If it doesn't, gently shake the mouse until the ball drops out of its socket.
5. Once the ball is free, use adhesive tape to pick up any dust or lint on the surface of the ball. Wipe away dirt or lint inside the mouse socket. You can also blow gently to remove dirt and lint. If lint is trapped inside the socket or on the rollers, use a cotton swab dipped in alcohol to loosen it.
6. Return the ball to its socket and snap on the mouse ball cover.

7. Your mouse is now ready to use. Power on your computer.

Mouse command-line switches

Several command-line switches for the mouse driver and control panel allow you to customize the operation of the mouse. Once you have installed the mouse driver, you can use command-line switches to change the way some mouse functions work. You can add these switches to the mouse command lines in your AUTOEXEC.BAT file. Or at your operating-system prompt you can type mouse along with the command-line switches you want to use (you can use just one switch, or several switches separated by spaces).

Changing mouse sensitivity

The command-line switches shown in Table 11-1 set the mouse sensitivity level:

Table 11-1.

Switch	Sets
/sn	Horizontal and vertical sensitivity
/hn	Horizontal sensitivity only
/vn	Vertical sensitivity only

The value of n is a number in the range 5 to 100 in increments of 5. It is interpreted as a control panel setting. For example, to set the horizontal and vertical sensitivities to 75, you would type mouse /75 at the system prompt.

Control panel button/key combinations

You can use the command-line switches shown in Table 11-2 to change the combination of mouse button and keys you use to display the control panel:

Table 11-2.

Switch	Sets
/k0	<Ctrl>+<Alt>+mouse button (default)
/k1	<Ctrl>+<Shift>+mouse button
/k2	<Ctrl>+<Shift>+<Shift>+mouse button

For example, to use the <Ctrl>+<Shift>+mouse button sequence to display the control panel, type:

```
cpanel /k1
```

and press Enter at the system prompt.

Mouse hardware configuration switches

You can use the switches shown in Table 11-3 to bypass the mouse driver's automatic hardware configuration search and instruct it to look for a particular type of mouse at a particular I/O port:

Table 11-3.

Switch	Sets
/i1	Mouse at primary InPort address
/i2	Mouse at secondary InPort address
/c1	Mouse at serial port 1 (COM1)
/c2	Mouse at serial port 2 (COM2)
/z	Mouse at PS/2-style port

For example, to specify that the mouse serial-interface cable is connected to COM2, type:

```
mouse /c2
```

and press Enter at the system prompt.

Changing the mouse-movement profile

You can use the /pn command-line switch to load specific mouse movement profiles where n is 1, 2, 3, or 4 and corresponds to one of the internal mouse-movement profiles listed on the control panel. For example, to specify the internal mouse-movement profile 2, type:

```
mouse /p2
```

and press Enter at the system prompt.

Changing the mouse language

You can use the switches shown in Table 11-4 to change the language in which mouse driver and control panel messages appear:

Table 11-4.

Switch	Sets
/l	English (default)
/ld	German
/le	Spanish
/lf	French
/li	Italian
/lnl	Dutch
/lp	Portuguese
/ls	Swedish
/lsf	Finnish

For example, to make messages appear in French, type:

```
mouse /lf
```

and press Enter at the system prompt.

Creating a custom mouse profile

The Setspeed program lets you set the acceleration of the mouse by loading a customized mouse-movement profile. Use the control panel to choose from four standard movement profiles: Slow, Moderate, Fast, or Unaccelerated. However, you can also create a custom mouse profile file that contains values for speeds that better suit your needs.

Understanding mouse-movement values

A mouse-movement profile determines the distance the pointer moves across your screen for a given movement of your mouse. The distance the mouse is moved is one factor that determines how far the pointer moves on screen. The speed at which the mouse is moved can also determine the overall travel of the pointer. The actual distance that the pointer moves for a given speed of mouse movement is determined by the mouse driver. The mouse driver contains the four preset movement profiles.

However, when you use the Setspeed program with your custom mouse profile, you override the preset acceleration and replace it with your own.

Creating a mouse-movement profile file

You can create your own profile file using any ASCII text-editing program. Just use the format of the sample file below and type in the values that you want. You can also modify the sample file called MOUSEPRO.FIL, included with your mouse files. The following values appear in this sample file:

```
LABEL: Slow
MOVEMENT:      5    10   20   30   40   50   60   70   80   90   100  110  120  127
FACTOR:       .1   .2   .3   .4   .5   .6   .7   .8   .9   .10  1.1  1.2  1.3  1.4

LABEL: Moderate
MOVEMENT:      5    10   20   30   40   50   60   70   80   90   100  110  120  127
FACTOR:       1.0  1.2  1.4  1.6  1.8  2.0  2.2  2.4  2.6  2.8  3.0  3.2  3.4  3.6

LABEL: Fast
MOVEMENT:      5    10   20   30   40   50   60   70   80   90   100  110  120  127
FACTOR:       1.0  1.5  2.0  2.5  3.0  3.5  4.0  4.5  5.0  5.5  6.0  6.5  7.0  7.5

LABEL: Unaccelerated
MOVEMENT:      64  127
FACTOR:       1.0  2.0
```

The top line of each entry is the label that defines the profile. In this sample file, the labels are the same as those appearing in the Control Panel—"Slow," "Moderate," "Fast," and "Unaccelerated." However, you can use any text label you want (up to 16 characters). When you run the Setspeed program, your labels are displayed in the control panel.

The numeric values in the lines labeled "MOVEMENT" and "FACTOR" are associated with one another. For example, in the "Slow" profile, the first value in the MOVEMENT line, 5, is associated with the value .1 below it. The value 5 represents the speed of your mouse—the distance it moves in a given period of time. The higher the number, the faster the mouse is being moved. The value of .1 in the FACTOR line is used to compute the pointer movement when the mouse is moved at a speed of 5. If you increase the value in the FACTOR line for a given value in the MOVEMENT line, you increase the sensitivity of the mouse at that speed, and vice versa.

Editing the sample file MOUSEPRO.FIL

You can change the values in either the MOVEMENT or FACTOR lines to change the way the pointer moves. For example, if you want a flat mouse- to-pointer relationship where the pointer movement is the same for any speed of mouse movement, the MOVEMENT/FACTOR entries would look like this (notice that the label has also been changed to "Flat"):

```
LABEL: Flat
MOVEMENT:     5   10  20  30  40  50  60  70  80  90  100 110 120 127
FACTOR:       .2  .2  .2  .2  .2  .2  .2  .2  .2  .2  .2  .2  .2  .2
```

The same effect can be created by the following:

```
LABEL: Flat
MOVEMENT:     127
FACTOR:       .2
```

To accelerate the pointer, you can increase the FACTOR value linearly as follows (again, notice the label has been changed to "Linear"):

```
LABEL: Linear
MOVEMENT:     5   10  20  30  40  50  60  70  80  90  100 110 120 127
FACTOR:       .1  .2  .3  .4  .5  .6  .7  .8  .9  1.0 1.1 1.2 1.3 1.4
```

When creating or editing mouse profiles, the following rules apply:

- ☐ Do not exceed 32 values per row
- ☐ Separate the values with one or more spaces
- ☐ Use MOVEMENT values in the range of 1 to 127
- ☐ Use FACTOR values in the range of 0.1 to 16.0 (leading and trailing zeros optional)
- ☐ Every MOVEMENT value must have a corresponding FACTOR value
- ☐ Label names cannot exceed 16 characters.

Using setspeed to load your custom mouse profile

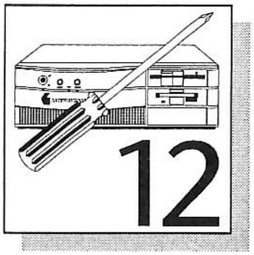
▶ To use Setspeed with your own mouse profile:

1. The mouse driver must be loaded before you use the Setspeed program.
2. At the system prompt, type:

```
setspeed /pn /ffilename
```

The value of n is the number of the mouse-movement profile you want (the number must be in the range 1-4); filename is the name of your customized mouse-profile file. You must include a value for n with the /p switch. If you leave off the /pn switch, all four profiles are loaded. If you want to use values in the current mouse-profile file, you do not need to include a filename with the /f switch.

Maintenance and Troubleshooting



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Introduction

If your computer system is misbehaving, please read through this chapter before calling Gateway 2000 Technical Service. The problem may be something simple that you can quickly solve yourself.

If you are unfamiliar with the internal layout of your computer, please take a few minutes to read Chapter 4, "Inside Your Computer System" before continuing.

If you still haven't solved the problem after reading through this chapter, call us! Our Technical Service staff stands ready to serve you. A technician will ask you to explain the problem you are experiencing, and then may ask you to serve as his or her hands or eyes in the field to diagnose the problem.

For information on contacting Gateway 2000 Technical Support, please refer to the Customer Support Guide supplied with your system.

Important! Use only a three-wire grounded power outlet for your computer. Do not cut or bypass the plug's grounding prong. **Any attempt to operate or service the computer without an adequate ground may result in serious personal injury and/or damage to the system.**

Maintenance

Use a damp, lint-free cloth to clean the system unit and monitor. Avoid abrasives or solvents — they can permanently damage the finish. Use a soft cloth and window cleaner to clean the monitor screen. Turn off the monitor. Then squirt a little cleaner on the cloth, and apply it to the screen.

All floppy disk drives should be cleaned periodically. Cleaning kits are available from a variety of sources. Carefully follow the instructions supplied with the cleaning kit you use.

Subjecting a system to a dusty or smoky environment significantly shortens its life and increases the probability of failure. If you use the system in a dirty environment, open it periodically and vacuum the boards and components with a small vacuum designed for this kind of work. Take care not to loosen anything in the process — sucking all the chips off the system board with an industrial strength wet/dry vac is *not* covered by your warranty!

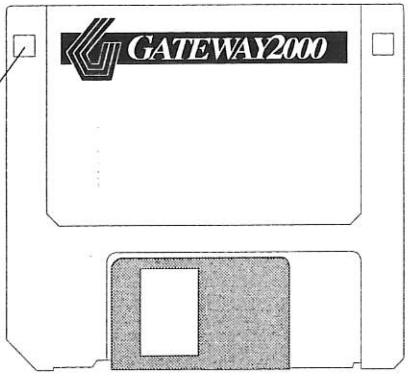
If the mouse pointer or cursor starts jumping erratically when you move the mouse, it is probably caused by a build-up of dirt on the rollers inside the mouse. Refer to Chapter 11 of this book to learn how to clean the mouse.

If you spill liquid inside the keyboard, unplug the keyboard immediately and turn it upside down to allow the liquid to drain out. Let the keyboard dry overnight before attempting to use it again. If it fails to work after drying, contact Gateway 2000 Technical Service.

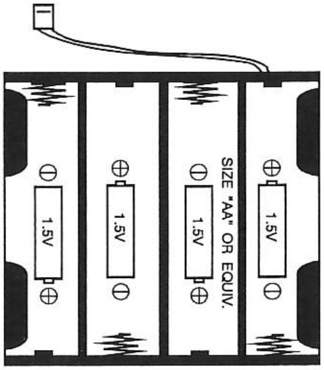
Problem	Probable cause	Diagnosis	Solution
System is dead. Power indicator does not light, no whirring noise from power supply fan or hard disk. Indicator lights on keyboard are not lit. No air movement from fan on rear of system unit.	Faulty wall outlet or blown circuit breaker or fuse.	Plug lamp or other device known to work properly into outlet.	Repair outlet, reset breaker, replace fuse, or use different outlet.
	Unplugged power cable.	Visual inspection.	Make sure all power cables are plugged in firmly.
	Defective power cable.	Visual inspection. Check continuity, try other cable.	Replace cable.
	Power supply failure.	Outlet and power cable check out OK, but system is still dead.	Contact Gateway 2000 Technical Service.
System is dead. Power indicator lights, whirring noise is audible. All three indicator lights on keyboard stay lit.	An expansion card is partially dislodged from its slot on the system board.	Turn the computer off. Open the system unit. Verify that all circuit boards are firmly seated in their slots. Check to see if any card is slightly tipped to the back of the machine.	Press down firmly on all circuit boards. If this fails to reseat the card, remove the card and bend the end of the metal mounting bracket away from card. Reinstall card.
	A defective expansion card.	Shut off the system. Remove a card. Power up system and check to see if the keyboard lights extinguish normally. Repeat with the next card until you locate the problem card.	Make sure the card is firmly seated at both front and back of card.
	A defective floppy disk drive or tape drive.	Shut off the system. Remove the cables from one of the floppy disk drives. Power up the system and check to see if the keyboard lights extinguish normally. Repeat until you locate the defective unit.	Contact Gateway 2000 Technical Service.

Problem	Probable cause	Diagnosis	Solution
System boots from floppy disk. Doesn't boot or read directory from hard disk.	Bad connection to drive or controller.	When you run the FDISK utility as described in Chapter 6 of this book, you receive "Unable to Format Drive" message.	Verify that connections to hard disk and controller card are made as described in Chapter 6 of this book; also check position of the drive select jumper.
	Damaged hard disk or controller.	(ESDI drives only) Low-level format the hard disk; if format fails, disk and or controller are probably defective.	Contact Gateway 2000 Technical Service for replacement drive.
	Hard disk directory or FAT is scrambled.	Run FDISK, format the disk for DOS, and reinstall DOS as described in Chapter 6 of this book. Restore data and applications from your backup and continue working.	You do make frequent backups, don't you? As mentioned elsewhere in this manual, all hard disks are vulnerable to damage, and should be backed up frequently to protect your data.
System boots from floppy disk. Doesn't boot from hard disk, but you can read hard disk directories, and access applications and data from hard disk.	Hard disk boot track has been scrambled.	Could be anything. **Note:** For best protection of your data, use a file-by-file backup method, rather than an "image backup."	Back up data and applications files, and then reformat drive as described in Chapter 6 of this manual. Restore data and applications from backup disks or tape and continue working.
"Sector not found" or other data errors occur when accessing data stored on hard disk.	Could be anything.	**Note:** For best protection of your data, use a file-by-file backup method, rather than an "image backup."	Backup whatever data you can, then partition, and format for DOS as described in Chapter 6 of this manual.

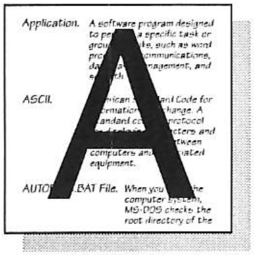
Problem	Probable cause	Diagnosis	Solution

System won't format 3.5-inch diskettes.	Incorrect FORMAT command for disks you are using.  Only high-density (1.44MB) diskettes have this cutout.		There are two types of 3.5-inch disks: 1.44MB high-density diskettes, and 720KB double-density diskettes. To format high-density diskettes (with cutout), go to the DOS prompt and type:
			`FORMAT b: <Enter>`
			To format double density diskettes (no cutout), type:
			`FORMAT b:/t:80/n:9 <Enter>`

Disks formatted on IBM PS/2 systems do not work in my system.	The PS/2 uses a slightly different format than other computer systems.		To transfer files from a PS/2 to your AT-type system, first format the diskette in the AT, then insert it in the PS/2 and copy the files.
After installing a new expansion card, (bus mouse, etc.) part of the system no longer works correctly.	New card is trying to use same interrupt or I/O address as another card in the system.	System may lock up, or part of system such as mouse or COM port may stop working.	Change interrupt or RAM address on new expansion card to eliminate the conflict. Experimentation may be needed. See Chapter 4. If the new card uses IRQ2, it may conflict with the VGA card. Remove JP3 from the VGA card to correct the problem. (See Chapter 9 for details.)
"Invalid Configuration" or "CMOS Failure..." message appears when system is booted.	Incorrect configuration information entered with system setup program.	Check configuration setup carefully. Correct the error. Refer to Chapter 5 of this book for details on the setup program supplied with your system.	Make sure setup correctly lists equipment installed in your system. Make sure hard disk type is set correctly as described in Chapter 5 of this book.

Problem	Probable cause	Diagnosis	Solution
System batteries have expired.		Battery pack is no longer maintaining system setup information (hard disk type, memory installed, etc.). System no longer keeps correct date and time.  ⊖ 1.5V ⊕ ⊕ 1.5V ⊖ ⊖ 1.5V ⊕ SIZE "AA" OR EQUIV. ⊕ 1.5V ⊖	Replace the batteries in the external battery pack installed inside the system unit with good quality AA Alkaline cells. The pack has a cable and plug that connects to a mating jack on the system board.
System has a hard disk drive which is much larger than 32MB, but the system only shows 32MB available.	Some hard disks are set up with a maximum partition size of 32MB. Check your system. In addition to the C: drive, you probably also have D: and E: drives, and perhaps many more. The rest of your disk's MB are accessible there. If you have MS-DOS 5.0 or 4.01 and want larger partitions, run FDISK to change the partition size and then reformat the drive as described in Chapter 6 of this book. (Back up the hard disk first!) Changing the partition size and reformatting removes all data from the disk.		
Restore from tape backup system seems extremely slow.	386/33 systems are so fast that many tape systems cannot keep up with them.		Turn off simultaneous disk and tape option in the tape backup software package. Faster operation will result.

Glossary



The following section contains brief, basic descriptions of frequently-used terms — they are not intended to be exhaustive.

Application. A software program designed to perform a specific task or group of tasks, such as word processing, communications, data base management, and so forth.

ASCII. American Standard Code for Information Interchange. A standard code, or protocol for displaying characters and transferring data between computers and associated equipment.

AUTOEXEC.BAT File. When you boot the computer system, MS-DOS checks the root directory of the disk you are booting from for the presence of a file named AUTOEXEC.BAT. The file contains instructions or procedures which are carried out each time the computer is booted.

Benchmark. A program or procedure which tests or evaluates the relative performance characteristics of different computer systems or peripherals.

BIOS. Basic Input/Output System. A program or set of programs permanently stored in ROM chips installed on the system board.

Boot. To start the computer system. Your computer is generally booted in one of three ways: by turning on the power switch, by pressing the reset switch, or by simultaneously pressing the <Ctrl>, <Alt> and <Del> keys. Booting the system after it has already been powered up and booted is referred to as "rebooting."

Bus Clock Speed. The speed at which the I/O bus runs.

Cache. *See* "Disk Cache" and "RAM Cache."

Chip. *See* "integrated circuit."

CONFIG.SYS file. When you boot the computer system, MS-DOS checks the root directory of the disk you are booting from for the presence of this file. CONFIG.SYS lets you change the computer system's default configuration.

Configuration. The way in which a computer and its peripherals are connected as a system.

Conventional memory. Random access memory (RAM) with addresses below 640KB; used for DOS and application programs.

Coprocessor. A microprocessor chip which connects to the CPU and performs certain mathematical computations (such as floating point arithmetic) faster than the CPU alone. To take advantage of this, the applications software you are using must be written specifically to support the coprocessor.

CPU. Central Processing Unit. A microprocessor on an IC chip that serves as the heart of the computer, performing numeric computations and controlling the peripherals connected to the CPU.

CPU clock speed. The speed (measured in MHz) that the system clock operates at. Systems with higher clock speeds perform tasks faster than systems with lower clock speeds. For example, a system that operates at 33 MHz is faster than a system that operates at 12 MHz.

DMA. Direct Memory Addressing. A method for transferring data to and from memory without going through the CPU.

Default. When a variety of options are presented, the default option is the option that is automatically selected by the software or system. You can override a default option by selecting an alternate choice.

DIP switch. A bank of switches used to change configurations or parameters on the system board or expansion cards.

Directory. This word has two meanings. It can refer to a collection of files and subdirectories on a disk, and also refers to a list of the files and subdirectories in a particular directory.

Disk. *See* "Floppy Disk" and "Hard Disk."

Disk cache. A software utility that speeds hard disk data access by storing in RAM data that is repeatedly read from or written to the disk. Some hard disk controller cards are equipped with their own on-board RAM cache.

DOS. *See* "Operating System."

DOS prompt. A message that appears on the display to tell you that MS-DOS is ready to receive a command. The default prompt is the current drive letter followed by a greater-than sign (>):

```
C>
```

Most AUTOEXEC.BAT files include a PROMPT command that modifies the DOS prompt to also display the current directory. For example,

```
C:\UTIL>
```

Expanded memory. RAM above 1MB accessed on an alternating basis (using bank switching) so that addresses appear to be below 1MB. Applications running under OS/2 cannot access expanded memory.

Expansion slot. A connector on the system board that can hold a card such as a display adaptor, disk drive controller, I/O card, memory expansion, and so forth. There are three types of expansion slots: 8-bit, 16-bit, and 32-bit. 8-bit and 16-bit expansion slots are currently standardized; the expansion slots on one manufacturer's system board are fully compatible with the slots on another manufacturer's board. There is currently no widely-accepted standard for 32-bit slots, so that the memory card for one manufacturer's system board cannot be installed in another manufacturer's system.

Extended memory. RAM above 1MB, with addresses above 1MB that some applications can address directly. Can be used to emulate expanded memory if your application(s) require it. Applications running under OS/2 can access extended memory.

File. A collection of information stored on floppy or hard disks. A file may contain part of the operating system, an application, or data (such as word processing, graphics, or spreadsheet documents).

Filename. Every file has a unique filename. A filename actually has two parts: the filename, and the extension, separated by a period (.). A filename is up to eight characters in length, and an extension is up to three characters in length. Generally, the filename describes the specific contents of the file, while the extension indicates the type of file. For example, the extension .EXE designates a program, while the extension .PM4 designates a PageMaker V4.0 document file.

Floppy disk. A 3.5-in or 5.25-in removable storage medium used for storing programs and files.

Format. A process which prepares a disk (floppy or hard) to hold data. For hard disks, there are two formatting processes — low-level formatting and high-level formatting.

Hard disk. A disk drive which has larger capacity and is faster than floppy disks. A hard disk may have removable or non-removable media. For some reason, IBM and Microsoft continue to refer to hard disks as "fixed disks," even though most of the world refers to them as "hard disks."

Hard disk partition. It is often desirable to divide large hard disks into several sections, called partitions. Partitions are created with the MS-DOS FDISK utility. Each partition is assigned a unique drive designator. The largest partition that some applications can access is 32MB, so we suggest using partitions smaller than this.

Integrated Circuit (IC). A combination of a large number of electronic components (transistors, diodes, and so forth) on a single silicone chip.

Interleaved Memory. Interleaving is an option on some system boards that increases processing speed by assigning memory locations on an alternating basis to two banks of RAM.

I/O Port. A connector that allows you to connect peripherals to a computer system. The two most common types of I/O ports are serial and parallel.

Jumper. An electrically-conductive part that is used to connect two or more points on a circuit board. Commonly used to select between options, or determine whether a particular option is on or off. When the jumper is installed, the circuit is shorted (closed). When the jumper is removed, or connected only to a single pin, the circuit is open.

MIPS. Million Instructions per Second.

Modem. A device that permits a computer to communicate with other computers over telephone lines.

MS-DOS. *See* Operating System.

Multitasking. The ability of a computer, operating system, or application to perform more than one task or operation at the same time. For example, a multitasking operating system might let you to simultaneously use your computer system to download information from a remote computer with a modem, print out a word processing file, and sort a data base.

Open. A circuit that is broken. Usually refers to removing a jumper from two pins on the system board. See also "Short" and "Jumper."

Operating System. Software which allows the user and whatever application programs are installed to communicate with the computer hardware. Your computer system is supplied with the MS-DOS operating system. Other operating systems (which may or may not work properly with your system) include Novell NetWare, Xenix, and OS/2.

Peripheral. Any device which is attached to or installed in the system unit. Examples include printers, modems, image scanners, and pen plotters.

Program. A set of instructions written in a computer language which instructs a computer to perform a task. *See also* "Application" and "Operating System."

Protocol. A set of rules or parameters for communications between computer systems or parts of a computer system.

RAM. **R**andom **A**ccess **M**emory. Computer memory used to temporarily hold programs and data. RAM is stored in ICs that plug into the system board, or into an expansion card which in turn plugs into slots on the system board. There are two basic types of RAM chips: Static RAM (SRAM) and dynamic RAM (DRAM). SRAM chips are faster, but are also more expensive than DRAM.

RAM Cache. A method of storing frequently-accessed data in static RAM that is much faster than the system's main memory, resulting in a significant increase in speed.

ROM. **R**ead-**O**nly **M**emory. Computer memory used to permanently store parts of the computer's operating system. ROM chips are installed in sockets on the system board. *See also* "BIOS."

Setup Program. Used to inform the computer about the peripherals attached to it, the amount of memory installed, the date and time, and so forth. The setup program is either stored in ROM, or on a floppy disk supplied with the system.

Shadow RAM. A method of relocating the system and/or video BIOS from slower ROM chips to faster RAM to improve system performance.

Short. An intentional or unintentional completion of an electrical circuit. Generally refers to installing a jumper between two pins. See also "Open" and "Jumper."

SIMMs. Single Inline Memory Modules. A relatively new way of packaging RAM chips that combines several compact chips on a small circuit board. Currently, SIMMs are available in 256K and 1MB sizes.

Software. A general term describing a program or set of programs.

System board. The large circuit board that covers most of the bottom of the chassis. It is the heart of your computer system, containing the CPU, the expansion slots, and often, the system's random access memory (RAM). Sometimes referred to as the "motherboard."

System unit. The chassis containing the system board, expansion cards, disk drives, and power supply.

Volume Label. An 11-character electronic label that can be created for hard or floppy disks. Labels are created with the MS-DOS LABEL command, and read with the VOL command.

Wait State. When a system's memory is slower than the CPU, the system's CPU delays, or "waits" for a portion of the processing cycle to avoid outrunning the memory. Some CPUs run with one or more wait states. Others run with 0 wait states, which means that the CPU does not have to slow down and wait for memory.

Write Precompensation. In a hard disk drive, the varying of the timing of the head current on inner tracks of the disk to maintain a constant signal. Some drives require write precompensation; most do not.

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